Digital and Windows NT

"The Next Wave of Enterprise Computing"

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ALLIANCE



MICROSOFT WINDOWS NT

MICROSOFT WINDOWS

"Alliance for Enterprise Computing"

The Alliance, Quotes, Questions and Answers
Clusters for Windows NT, FAQ, AltaVista
TPC-C, C2, Objects, DCE, FX!32, Notes
Enterprise and Network Management

Making the connection

october 1996

Content

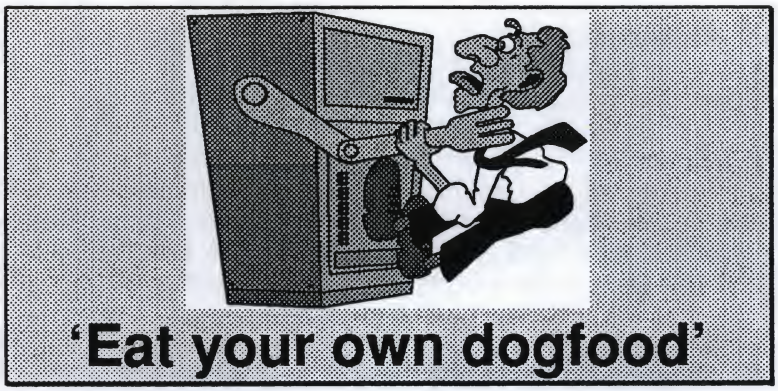
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"Eat Your Own Dogfood" is de methode die Dave Cutler gebruikte om zijn 250 programmeurs in een korte periode van 3 jaar een complex (6 miljoen regels code), robuust, portable, uitbreidbaar, schaalbaar, krachtig, compleet en uiterst modern Client/Server besturings systeem te laten bouwen"

Dave Cutler is de Architect van ***Microsoft's*** besturingssyteem ***Windows NT***

Dave Cutler is wellicht de enige besturingssysteem architect, die 4 besturingssystemen heeft ontworpen. Net als zijn innovatieve en krachtige VMS besturingssysteem, bij Digital in het begin van de tachtiger jaren, verovert zijn ***Microsoft Windows NT*** nu de markt in een zeer korte tijd.

De fantastische reis naar ***Windows NT*** van Dave Cutler en zijn team wordt verteld in het boek Show-Stopper van Paul Zachary. (The breakneck race to create ***Windows NT*** and the next generation at ***Microsoft***, ISBN 0-316-91113-5)

*"We believe that many Digital MIS personnel will gravitate towards **Windows NT**. As a result of Dave Cutler, NT's architect, NT bears a strong resemblance to OpenVMS."*

Chris Christiansen, IDC,
Digital's NT strategy, 1994

Waarom *Windows NT*?

Omdat ***Windows NT*** gemaakt is in deze tijd en met de eisen en technologie van morgen. ***Windows NT*** is het besturingssyteem van een nieuwe generatie met een ongekende potentie in kracht en groei. En de industrie en gebruikers hebben deze technologie snel geaccepteerd en tot realiteit verklaart.

Digital heeft ***Windows NT*** vanaf het begin gezien als een besturingssysteem dat niet alleen past in Digital's Client/Server strategie, maar ook in de realiteit van de IT markt. Digital ademt in haar totale structuur als geen andere IT leverancier dit vertrouwen in ***Windows NT*** uit.

en waarom Digital & *Windows NT*?

***Microsoft* en Digital delen visies over 'Enterprise Computing'.**

Microsoft levert daarvoor 'state-of-the-art' producten in de Windows familie, zowel voor de Desktop als de 'Enterprise server', zoals de ***Microsoft*** Office en BackOffice producten. Producten die door miljoenen gebruikers dagelijks worden gewaardeerd, simpelweg omdat ze leveren wat de gebruiker nodig heeft. ***Microsoft's IIS (Internet Information Server)*** en ***MS-Explorer*** zijn de laatste uitingen van krachtige server en desktop producten voor het Internet.

Digital is volgens ***Microsoft*** de leverancier die niet alleen weet wat het is om grote aantallen gebruikers, soms duizenden, te laten functioneren in IT infrastructuren, maar ook daarvoor de innovatieve technologie levert en de kennis en kunde om heterogene multivendor omgevingen te beheren en beheersen. Tegen de juiste kosten in een flexibele omgeving.

STRATEGISCHE MICROSOFT-DIGITAL ALLIANCE:

'Imagine The Combination'

digital™ Microsoft®

A L L I A N C E

Digital en ***Microsoft*** werken al meer dan 10 jaar nauw samen en hebben sinds 1995 een 'Stategische Alliantie' voor Enterprise Computing (AEC).

The magnitude of what we are doing here -- the clustering agreement, joint engineering, joint field teams -- is much bigger than what we have done in the past with other alliances.

Bill Gates
Reuters, Aug 2, 1995

"Digital has one of the largest worldwide maintenance and service organizations in the industry. They also have an excellent record for quality and dependability. By working together, we can greatly extend the services available for customers of ***Windows NT****,* ***Microsoft*** *Office, and other* ***Microsoft*** *products."*

Steve Ballmer
Executive Vice President
Sales and Support
Microsoft **Corporation**

Deze alliantie kent vele facetten in termen van gezamelijke productontwikkeling, marketing en verkoop, maar ook training van meer dan 2300 ***Microsoft*** specialisten (MCP) bij Digital, wereldwijd. In Nederland vindt u op dit moment (juli 1996) al meer dan 70 gecertificeerde Microsoft specialisten, waarmee eens en te meer Digital zich profileert als een 'innovator'. Belangrijk voor u als gebruiker is dat deze combinatie de kennis, kunde en technologie levert die Windows maakt tot een compleet besturingssyteem in complexe omgevingen en continuïteit biedt voor ***Windows NT*** in heterogene omgevingen

*"****Microsoft*** *is our most strategic partner today"*

Enrico Pesatori
Vice President & General Manager
Computer Systems Division
Digital Equipment Corporation

"We've been watching with interest the growing relationship between ***Microsoft*** *and Digital Equipment.*
What began in the 1980s as a simple OEM arrangement has become a strategic alliance of vital importance to both companies. Digital gives ***Microsoft*** *entree into the enterprise computing realm and is applying advanced server technologies to* ***Windows NT****.* ***Microsoft*** *gives Digital high-volume platforms and new opportunities to leverage its worldwide support capabilities."*

Windows Watcher, August 1995

HARDWARE, Intel en Alpha (RISC) systemen;

Intel: *HiNote notebooks voor Windows NT*
Venturis en Celebris Desktops
Prioris, single processor en SMP multiprocessor Server

Alpha *AlphaServers, single processor en SMP Multiprocessor*
AlphaStations Desktop

Windows NT, het meest moderne besturingssysteem van vandaag en morgen, is Processor onafhankelijk ontworpen en draait zowel op ***Intel*** als op ***RISC*** architecturen.

Digital's totale Intel lijn, Notebook's, Desktop's en Servers, is uitgevoerd met de Intel Pentium of Pentium Pro processoren. Snelheden variëeren tussen 100 en 200Mhz (juli 1996).
Digital's Intel producten onderscheiden zich door integratie van state-of-the-art technologiëen, de laatste Intel processor techniek, standaard PCI bus, robuuste architectuur.
Daarnaast biedt Digital ook een scherpe prijs en 3 jaar garantie.

RISC architecturen kenmerken zich in het algemeen niet alleen door fantastische prestaties, maar ook door robuste en betrouwbare systemen gebouwd rond deze RISC architecturen.

Digital is zo'n leverancier van bewezen stabiele systeem architecturen.

Beroemd is de 32-bit VAX architectuur die de IT verbijsterde in 1977, met daarbij een evenzo innovatief besturingssysteem VMS. VMS ook een product van ***Dave Cutler.***

In 1992 verbijsterde Digital wederom de IT wereld met de introduktie van een 64-bit Architectuur. De Alpha RISC architectuur, gebouwd rond 's werelds eerste 64-bit chip met een ongeëvenaard prestatie niveau. Normaal gesproken wisselen leveranciers elkaar een aantal keren per jaar af met de snelste processor of machine. Met de Alpha is dat anders geworden, sinds de introductie in 1992 is Digital met Alpha leidend in prestatie, iets wat geen ander leverancier kan nazeggen.

Deze technologische kennis, kunde en ervaring wend Digital aan voor het bouwen van zowel Intel als Alpha systemen. Dit voor zowel single processor systemen als multiprocessor SMP systemen.

Windows NT is ontworpen om optimaal gebruik te maken van SMP architecturen.

Met de combinatie van Intel gebaseerde systemen en Alpha gebaseerde systemen, biedt Digital de ***Windows NT*** gebruiker het meest brede en schaalbare systeem aanbod in de industrie.

Voor welke omgeving van ***Windows NT*** dan ook, er is altijd een Intel of Alpha systeem met de juiste capaciteit en met de beste prestaties voor de juiste prijs.
Deze krachtige, robuuste en schaalbare architectuur, krijgt op al deze punten een extra dimensie door Digital's vermaarde Cluster technologie, die nu ook beschikbaar is voor Windows NT.

Naast ***Windows NT*** draait ook OpenVMS en Digital UNIX op het Alpha platform en met dezelfde gegarandeerde binaire compatibiliteit en groei.

Dat vinden inmiddels de gebuikers ook, wereldwijd zijn er sinds 1992 meer dan 190.000 Alpha systemen verkocht en geinstalleerd met meer dan een miljoen aangesloten eind-gebruikers.

Recent, juni 1996, heeft ***Microsoft*** geannonceerd, met behulp van Digital (als onderdeel van de Alliantie), ***Windows NT*** versneld naar 64-bit te brengen.
Dit betekent niet alleen een sterke progressie in de inzetbaarheid van ***Windows NT*** in bedrijfskiritische omgevingen, maar ook dat die 64-bit ***Windows NT*** straks gewoon draait op de Alpha van vandaag. Dat is wat je noemt investerings bescherming.

Naast 64-bit, gaat ***Microsoft*** ook samen met Digital ***Windows NT*** geschikt maken voor het besturen van zg. Very Large Databases (VLDB). Hier mee zal straks ***Microsoft's*** SQL database tera-bytes kunnen aanspreken i.p.v. giga-bytes.

Met deze ontwikkelingen in ***Windows NT*** en Intel en Alpha technologie, vult Digital de belofte in v.w.b. de capaciteit en functionaliteit en biedt de gebruiker ongekende verwerkingskracht en gegarandeerde groei tot ver in de 21ste eeuw.

Microsoft® **has committed to**
Alpha as a strategic platform

Hetgeen betekent dat u als gebruiker van ***Windows NT*** tegelijkertijd de beschikking krijgt over nieuwe ***Microsoft Windows NT*** en BackOffice producten op Intel en Alpha
Bovendien zijn BackOffice producten 'Alpha' bewust en zodoende geoptimaliseerd.

"The Micorosoft-Digital alliance is a renewal of our commitment to Alpha. It is a resounding endorsement of Alpha as a premier platform."

Bill Gates, Chairman and CEO
Microsoft Corporation
PC Week, August 2, 1995

Hoe krachtig is Alpha ?

Variëerend van 266MHz tot 433MHz klok-snelheden en meer dan 432 SPECint92 en 610 SPECfp92 en meer dan 13 SPECint95 en 18 SPECfp95 (per processor).
Dit is de absolute top vandaag de dag verkrijgbaar. En terwijl de concurrentie hun architecturen naar 64-bit brengen en medio 1997 met deze cijfers gaan meedoen, zal eind 1996 de Alpha over de 500MHz draaien met meer dan 1000 SPECfp92 leveren.
Wist u al dat voor het jaar 2000 Digital de eerste single-processor Alpha systeem zal leveren met 1 GigaHertz !!!!!!

"...the X86 architecture has caught up with most of the RISC designs, and with the advent of the P6, poses a serious threat to all RISC manufacturers, with the exception of Digital and its Alpha processors."

Dataquest, June 12, 1995

Voor ***Windows NT***, zowel ***Windows NT*** Station als ***Windows NT*** Server, is Alpha het krachtigste platform wat u kunt verkrijgen voor de beste prijs/prestatie verhouding in de markt.

Daarnaast levert Digital in de Intel en Alpha desktop serie een zg. 'Hybride' Personal ***Windows NT*** systeem. Dit systeem is naar keuze met een Intel Pentium of Alpha processor uit te rusten en kan dus makkelijk worden aangepast aan de prestatie wensen.
In een desktop omgeving, waar op elke plek een andere prestatie-eis wordt gesteld, kan men met dit Personal workstation dat niet alleen invullen, maar ook nog met 1 systeem architectuur.

"Normally you see a ten to 20 percent performance gain from a new product. Here you see a machine [AlphaStation 600] that is double its nearest competitor using standard benchmarks."

Tom Copeland, Industry Analyst, IDC
Los Angeles Times, July 14, 1995

KEIHARDE BEWIJZEN UIT DE INDUSTRIE OVER DIGITAL EN *WINDOWS NT*:

één van de meest sprekende performance testen in de industrie is de TPC-C benchmark.
Deze TPC-C uit zich in een tpmC (transacties per minuut) en voor een dollar prijs per transactie over een periode van 5 jaar.

Sinds september 1995 is Alpha is hierin de absolute leider voor ***Windows NT***

Inmiddels snelt de tijd voort. Lag het prestatie niveau voor Alpha in 1995 op;

3194 tpmC voor $196 per tpmC (AlphaServer 2100 5/300)

Inmiddels is die grens alweer verlegd naar;

6056 tpmC voor $223 per tpmC (AlphaServer 4100)

Ook voor Intel gebaseerde SMP servers wordt inmiddels meer dan 5000 TpmC gehaald.
Ook hier is duidelijk dat Digital met Intel en Alpha op alle niveau's prestaties levert voor de juiste prijs.

Ander signalen van waarding uit de markt voor deze Digital systemen komt bv. Van AIM.
AIM technology presenteert 2 keer per jaar haar zg. 'Hot Iron Awards'. Deze awards laten zich vertalen in 15 zg. Prijs/prestatie niveau's.
Digital kreeg februari jl. 11 van de 15 awards, waarbij 6 Alpha systemen en 5 Intel systemen.

Eind 1996 begin 1997 zal ***Microsoft Windows NT*** meer laten profiteren van SMP en worden systemen met meer dan 4, zelfs 6 of 8, processoren ondersteund.
Het is dan ook goed te weten dat Digital Alpha systemen levert, met een standaard PCI-bus, met 6 of 12 processoren, een ***Windows NT*** mainframe ?

*In 1995, an estimated 2,420,000 workstations and servers using **Windows NT** operating system will be shipped, compared with just 565,000 shipped last year. Of that 2,420,000, roughly 195,000 will be high-speed RISC platforms, nearly all of which will be Digital platforms.*

Rob Enderle
Dataquest
the Wall St Journal
Aug 3, 1995

SOFTWARE EN TOEGEVOEGDE FUNCTIONALITEITEN:

Digital heeft vele producten ontwikkeld die ***Windows NT*** optimaal laten functioneren in heterogene multi-vendor netwerken. Producten bv. Voor (een selectie);

hoge beschikbaarheid	Clusters for Windows NT (Intel en Alpha)
connectivity	DCE, Objectbroker
beheer	ClientWorks, ServerWorks, NetView, AltaVista manager for BackOffice

Maar ook voor gebruik van standaard ***Windows NT*** applikaties.

Voor Intel zijn inmiddels wereldwijd meer dan 3500 'native' 32-bit Windows (WIN32) applicaties. Meer dan 1500 applicaties, tools of databases draaien onder ***Windows NT*** op Alpha. Applicaties bewust van de enorme kracht van ***Windows NT*** en de Alpha architectuur.

Voor Alpha geldt dat alle bekende applicaties dan ook beschikbaar zijn op Alpha, zoals internet servers als IIS en Netscape, maar ook groupware als MS-Exchange en Lotus Notes.

Voor AlphaStations, met ***Windows NT*** station software, de meest geoptimaliseerde omgeving voor Grafische bewerkingen (CAD) en mathematische berekeningen is dan ook al lang bv. Autocad beschikbaar.

"Digital has the leadership position today in providing NT-based high performance, price/performance platforms for production, enterprise applications. Aberdeen does not believe that any other major systems suppliers will be able to surpass Digital's position within the next several years."

Aberdeen Group, August 1995

Digital's innovatieve kracht vertaalt zich continu in toegevoegde waarde voor ***Windows NT***. INTEL applicaties, geschreven volgens de WIN32 standaard van ***Microsoft*** (Windows 95 branded) draaien naadloos op Alpha door het product ***FX!32***, sterker nog ze presteren beter dan op INTEL. Geen emulatie maar een binaire vertaling, 1-malig, naar geoptimaliseerde Alpha ***Windows NT*** code !.

Deze technologie is op de laatste COMDEX, de meest belangrijke IT beurs op de globe, verkozen door het toonaangevende magazine BYTE en beloont met de begeerde:

'Most significant technology Award, Byte Magazine, Comdex 1995'

Standaard INTEL ***Windows*** applicaties (Windows 286, 386 en DOS) draaien binnen ***Windows NT*** probleemloos middels het aanwezige mechanisme van 'Insigna'. Dit geldt zowel voor Intel compatibility als voor Alpha. Hiermee kan elke Intel of Alpha Desktop de duizenden ***Windows*** 16-bit applicaties transparant draaien.

Naast een perfect besturingssyteem en robuste en stabiele Alpha systemen en uiteraard een keuze in applikaties levert de ***Microsoft***-Digital allianties vele producten die ***Windows NT*** in de enterprise laat functioneren.

Naast Objecttechnologie (OLE-CORBA), DCE voor ***Windows NT***, levert Digital de technologie om ***Windows NT*** een hoge beschikbaarheid te geven.

CLUSTERS VOOR *WINDOWS NT*:

Digital als uitvinder van Clusters biedt deze technologie aan sinds Juni 1996 voor ***Windows NT***.

Clusters biedt de gebruiker van meerdere ***Windows NT*** systemen een hoge beschikbaarheid op systeem niveau. M.a.w. het systeem is altijd beschikbaar voor de gebruiker. Daarnaast biedt Clustertechnologie u een effektieve investering, u gebruikt immers alles wat u koopt, en biedt u een uiterst flexibele omgeving, zonder enige afhankelijkheid in de applicaties.

Microsoft ontwikkelt op dit moment de standaard voor Clusters for Windows NT. Deze zg. API definitie is ook wel bekend onder de naam 'Wolfpack".
Digital heeft daarin een grote inbreng met haar Clustertechnologie voor Windows NT die nu beschikbaar is. ***Microsoft*** heeft Digital technologie geadopteerd (Licentie als onderdeel van de Alliantie) en zal medio 1997 Clusters toevoegen aan de Windows NT familie teneinde ***DE DEFACTO*** standaard te zetten voor Clusters voor ***Windows NT***.

Nadat *Microsoft* hun versie van *Clusters for* ***Windows NT*** heeft uitgebracht, wordt deze door Digital als standaard geadopteerd.
Daarna zal Digital zich blijven onderscheiden met toegevoegde waardevoor *Clusters for* ***Windows NT*** op basis van haar leiderschap in technologie kennis en kunde.

Een voorbeeld hiervan is dat begin 1997 Digital memory-channel technologie (100Mbyte ! cluster interconnect) toevoegt aan *Clusters for* ***Windows NT,*** waardoor SMP schaalbaarheid over de Cluster wordt bereikt !.

Lees voor meer gedetailleerde informatie de *Clusters for* ***Windows NT*** *White Paper.*

"We use the Digital VMScluster as a Reference Standard"

Criteria for evaluating System Clusters,
Gartner Group

Op de COMDEX van 1994, ook toen de meest belangrijke IT beurs op de globe, toonaangevende magazine BYTE deze technologie en beloonde Digital met de begeerde:

'Most significant technology Award, Byte Magazine, Comdex 1994'

Zowel dus in 1994 als 1995 de meest belangrijke prijs van de COMDEX voor ***Windows NT*** gebaseerde technologie. Dit is wat Digital bedoelt met commitment !

Uiteindelijk is het voor de beheerder van systemen in multivendor omgevingen ook zeer belangrijk om ***Windows NT*** integraal te kunnen beheren.

Microsoft heeft met SMS (System Management Server) al de perfecte tool om uw desktops te beheren. Digital biedt bovenop SMS, dus niet i.p.v., AltaVista Manager for BackOffice.
Met AltaVista Manager for BackOffice kunt u als beheerder niet alleen uw ***Windows NT*** server managen, maar ook de eventueel aanwezige UNIX server (Digital UNIX, HP-UX, AIX, Solaris), Novell en OpenVMS, zowel op het LAN als op het Intranet.
1 Grafische window, de look-and-feel van SMS, voor een heterogene omgeving.

> *__Microsoft__ wants very much to see Digital move __Windows NT__ into the enterprise. [The investment] shows __Microsoft__ is extremely serious about working with it.*
>
> **John Logan, Aberdeen**
> **The New York Times**
> **Aug 3, 1995**

Heeft u als beheerder ook nog de wens ***Windows NT*** te kunnen managen in een NetView omgeving, gebaseerd op SNMP, dan biedt Digital met Netview op ***Windows NT*** u tesamen met SMS en AltaVista Manager for BackOffice de ultieme management droom: 1 management station, 1 look-and-feel, 100% geintegreerd en voor desktop kosten !

Voor beheer van Clients en Servers in LAN-omgeving levert Digital standaard op al haar Intel en Alpha systemen de beheerstools ServerWorks en ClientWorks mee.

Met het aanbod van SMS plus AltaVista Manager for BackOffice, NetView on NT, ClientWorks en ServerWorks biedt Digital u het meest complete en geïntegreerde beheers platform voor ***Windows NT*** en hetreogene omgevingen.

CONCLUSIE & BEVESTIGING UIT DE MARKT:

> *"We hereby declare Digital Equipment Corp.'s Alpha-__Windows NT__ strategy to be a success. ...We won't predict that __Windows NT__ based Alpha servers will take over every corner of the computing universe, but it seems clear that interest in __Windows NT__ as an application server will continue to gain momentum. As it does, interest in Alpha will increase hand in hand with it — and DEC's 'bet the company' move looks better and better."*
>
> **Stan Gibson,**
> **PC Week Editorial, Sept. 11, 1995**

digital

Corporate Software Strategy
Windows NT Software

Executive summary

Today's information technology marketplace is searching for ways to bring the economic advantages of the PC computing model to the enterprise computing infrastructure. Long the dominion of mainframe and distributed minicomputer systems, enterprise computing provides sophisticated and proven capabilities for running production and business-critical applications, but at costs that are an order of magnitude higher than those of today's client/server and PC LAN computing technologies.

But developing and deploying business-critical applications on PC-based client/server systems -- and integrating these technologies with the legacy systems currently required to conduct business today -- is a complex and difficult undertaking. Increasing percentages of IT budgets are being spent on outside professional and support services to develop migration strategies and pilot programs, while few core enterprise computing infrastructures have been upgraded to less costly newer technologies because of the risks involved. The desire and pent-up demand for moving to enterprise client/server computing is there -- but the best means has not been clear until very recently.

Today there is rapidly growing interest in Windows-based computing based on OLE and Win32 APIs as the software platform infrastructure for moving to enterprise client/server computing. Windows NT is particularly well-suited to integrating the mainframe and minicomputer-dominated information architectures of the 70's with the PC applications and PC LANs of the 80's. Windows NT is attractive to customers for a number of reasons including its:

- Enhanced functionality, reliability, manageability, and security compared to existing PC-LAN alternatives
- Non-proprietary, de facto standard environment with long term viability and life-cycle cost-of-ownership advantages compared to proprietary minicomputer/ mainframe OSs
- Availability of enterprise extensions from leading systems vendors such as Digital (e.g., Clusters, Systems Network Management, OLTP, etc.)

Windows NT offers the vision of a single consistent operating system that meets the needs of traditional PC computing, workstation computing, PC LAN computing and traditional mainframe and minicomputer computing. While customers recognize that this vision is

not fully available today, Windows NT offers a credible opportunity to achieve that vision within a reasonable period of time.

Digital is particularly well-positioned to support Windows NT as an "enterprise-class" computing solution, adding unique value through high performance systems, enterprise software capabilities, and complete solution services. Additionally, Digital is investing significant resources in optimizing the performance of and delivering best-in-class support for Microsoft's Client/Server foundation on Digital's Intel and Alpha platforms. Digital's track record in providing enterprise computing solutions, the similarities between the OpenVMS and Windows NT operating systems, and Digital's strategic alliance with Microsoft enable Digital to offer unique experience and know-how to customers moving Windows NT into the enterprise.

Digital's Windows NT Platform Software Business strategy is to provide complete operational solutions that enable customers to integrate Windows NT into their enterprise information architecture. Digital differentiates its NT offering by providing value-added software in areas such as clustering, OLTP, and network systems management that are critical to enterprise and business-critical implementations.

Digital will deliver Windows NT software and services for enterprise computing across the broadest, most scaleable range of Intel and Alpha systems, and continue to offer the highest performance Windows NT systems available in the marketplace. Digital also differentiates its Windows NT offering by providing global services and support to integrate Windows NT into a heterogeneous enterprise.

Specifically, Digital will differentiate its Windows NT offering, through:

- Its ability to deliver, with and through partners, a complete Windows NT-based solution, with the functionality, reliability, scalability, manageability, and security needed in today's mission-critical computing environments
- Its ability provide Windows NT users and systems with access to legacy applications and data
- Its Connectivity Software and systems integration services for developing Windows NT-based client/server solutions in a heterogeneous computing environment
- Its unique business and technology alliance with Microsoft
- Its worldwide service, training, and support

Today, Digital delivers:

- The best-in-class and broadest range of Windows NT systems price/performance with its Intel and Alpha platforms
- Windows NT-based Connectivity Software for client/server solutions in a heterogeneous computing environment

- Aggressive marketing and distribution of Windows NT-based products through indirect channel partners and Digital's own account sales organization
- Worldwide services to integrate, support, and extend Windows NT into enterprise computing environments

In addition, Digital has already demonstrated a Windows NT clustering capability and Microsoft has agreed to license this award-winning technology from Digital.

Digital differentiation

Digital differentiates itself as the best provider of Windows NT enterprise solutions in three areas:

Leadership Windows NT System Price/Performance

- Intel Pentium- (and soon, P6-based) Windows NT servers in both single and SMP configurations
- Proven single-processor and SMP Alpha RISC server technology that extends the performance range for Windows NT servers well beyond Intel server capabilities

Leadership Windows NT Software

- Value-added, unique software extensions and enhancements to Windows NT
- Traditional strengths in enterprise computing and integrating heterogeneous computing environments

Leadership Windows NT Support

- In-depth Windows NT knowledge and expertise
- Technical as well as marketing relationship with Microsoft
- Worldwide service delivery infrastructure and capabilities

Business strategy

Digital's Systems Business Units software strategy is to provide customers with a platform software portfolio for each of Digital's strategic operating systems (Digital UNIX, Windows NT, and OpenVMS) that is both complete and comprehensive. The preference is to partner with leading independent software developers (ISVs) for key systems software and applications. When software is not available from partners, Digital will design and engineer its own products to maintain customer satisfaction, complete portfolio

solutions, and differentiate its platforms. The platform strategy will treat the Connectivity Software Business Unit as a preferred but non-exclusive partner.

In order to meet the fast-growing market demand for enterprise solutions, Digital's Platform Software Business strategy for Windows NT involves three major areas of focus:

1. Deliver "whole products" to off-the-base target markets
2. Partner with Microsoft
3. Address the specific needs of Digital's OpenVMS installed base

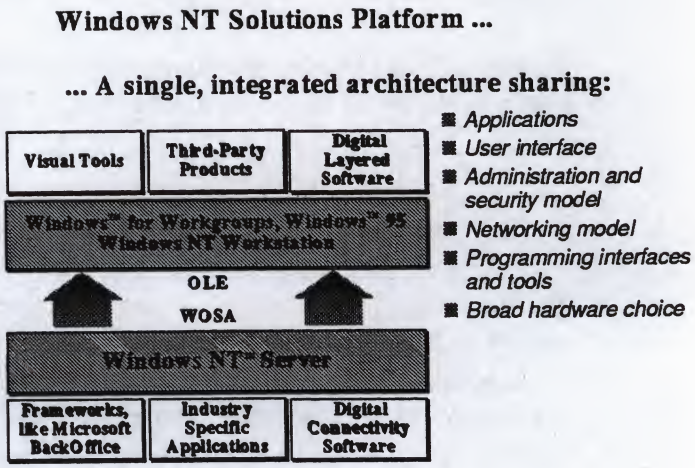
The first area of focus will concentrate on two areas: (1) delivering high-volume, packaged Windows NT solutions via indirect channels to enterprises of all sizes; (2) integrating and architecting complete enterprise Windows NT solutions, especially for medium-to-large enterprises. In both of these areas, Digital will deliver and integrate its systems, software and services with de facto standard Microsoft technology and other key Digital partners' software and services.

For example, Digital is partnering with Microsoft and several leading ISVs such as Autodesk, Bentley, PTC, VIEWlogic, Mentor, Process, Oracle, Informix, Sybase and industry-specific ISVs to develop, optimize and co-market complete Windows NT-based solutions in targeted markets such as MCAD, information management, workgroup computing, Internet, LAN consolidation and industry applications.

The second area of focus is in working jointly with Microsoft on key software technologies and applications for Windows NT on Intel and Alpha. Digital will leverage Microsoft's selection of Digital's cluster technology in order to differentiate Digital's systems and services, and Digital will deliver value-added cluster solutions on top of Microsoft's Windows NT clusters. Digital will optimize the performance of Windows NT, BackOffice and other Microsoft Solutions Foundation software on Digital's Intel and Alpha systems. Additionally, Digital will provide best-in-class services and support for deploying and integrating Microsoft's architectural foundation for next generation client/server solutions. Together, Digital and Microsoft will accelerate joint marketing, ISV recruitment, and channels development activities, and Digital will compliment Microsoft with unique professional and support services for the Windows NT platform.

The third area of focus will be to continue to address the needs of Digital's OpenVMS installed base through an increased integration of OpenVMS and Windows NT. Studies show that current OpenVMS customers have a high level of interest in implementing Windows NT, and that there is a growing interest in Windows NT and OpenVMS interoperation. Under the OpenVMS/Windows NT Affinity program, Digital and Microsoft have set up a joint engineering committee to integrate parts of OpenVMS technology with Windows NT, and integrate parts of Windows NT technology with OpenVMS, to take the similarities that these two operating systems already have with each other and make their coexistence tighter and more seamless in an enterprise computing environment.

Product strategy



Digital's NT Software Product Strategy is to deliver a complete portfolio of software to enable deployment of Windows NT solutions throughout the enterprise. The four primary sources of Windows NT software that will collectively add up to the most complete Windows NT software portfolio in the industry are:

1. Microsoft OS software
2. Frameworks such as Microsoft BackOffice, Lotus Notes and Oracle Workgroup 2000
3. Other ISV partner software such as software development tools, enablers, middleware, and industry applications and
4. Digital-developed software which fills in gaps in the portfolio and uniquely leverages Digital's hardware and services offerings, e.g. NT Clusters

Digital's Windows NT Software Strategy includes software capabilities to integrate Windows NT into multi-vendor legacy environments as well as to help Digital's installed-base customers leverage their past investments in Digital technology. (Please reference the Connectivity Software White Paper for more detail.)

Digital will add software value to Windows NT by:

- Optimizing Microsoft's operating systems and application software and other key third-party enabling software and tools for Digital's Intel and Alpha platforms
- Differentiating Digital's Windows NT platforms through ease of installation and use, software development, integration and manageability as well as leadership price/performance, reliability and scalability
- Developing products in areas of Digital core competence (distributed computing, system and network management, availability and scalability) to complement base product and OS capabilities.

Product offering

Digital will be a leader in providing Windows NT throughout the enterprise as a strategic server and high-end client operating system. Digital will deliver software and services for the enterprise across the broadest range of systems on Intel and Alpha processors.

Digital differentiates its Windows NT offering by providing:

- the highest-performance Windows NT systems available
- value-added software in such areas as NT clusters, OLTP, cross-platform application integration (CORBA), Network and Systems Management
- selected software products targeted at delivering on OpenVMS customer needs as defined under Digital's Affinity program
- value-added software, from Microsoft and other leading enterprise software partners, which is optimized for the Alpha architecture
- global services and support to integrate Windows NT into a heterogeneous enterprise and
- leadership in its Windows NT offerings through its continued services and product alliance with Microsoft

Digital will deliver Windows NT solutions comprised of software from Microsoft, leading Independent Software Vendors, and Digital's Connectivity Software Business Unit.

Operating System and Middleware:

- Windows NT Workstation and Server
- SMS
- ObjectBroker
- DCE
- Systems and Network Management
 - POLYCENTER AssetWORKS
 - POLYCENTER Manager on NetView for Windows NT
 - POLYCENTER DECnet Manager for Windows NT
 - ManageWorks

PC Integration

- PATHWORKS for NT
- MS Client Service for NetWare
- MS Gateway Service for NetWare
- MS NWLink
- MS Migration Tool for NetWare
- MS File and Print Service for NetWare
- DCE
- eXcursion

Application Development Environment and Tools

- VC++
- DEC Fortran
- DEC Forte
- PowerSoft and Watcom tools

Mail and Messaging

- Exchange
- Exchange/ALL-IN-1 integration
- TeamLinks

Groupware/Collaboration

- Exchange
- Lotus Notes
- Purveyor

Transaction Processing

- ACMSxp (future)

Database/dpData Warehousing

- Oracle Workgroup Server
- SQL Server
- SNA Server
- Oracle Rdb
- Sybase
- Informix

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Digital-Microsoft Alliance
At-A-Glance
2nd of August 1995

Digital and Microsoft have announced an agreement with exciting and unprecedented implications for our customers and for the computer industry. This agreement accelerates our customers' leap to the next wave of enterprise computing. Called the "Alliance for Enterprise Computing," this broadened relationship combines our companies' complementary corporate technologies. As a result, customers can implement Microsoft Windows and Windows NT-based business applications and easily integrate them into the most complex computing environments.

This agreement has tremendous ramifications for our Alpha-based business, further legitimizing our industry-leading computer architecture. Microsoft is committing its products to Digital's Alpha-based systems, releasing server software simultaneously on Alpha and Intel systems, releasing client software simultaneously on Alpha and other RISC systems, as well as licensing Digital's clustering technology. Microsoft engineering is committed to work with Digital so that Microsoft applications achieve maximum performance on the Alpha architecture. Also, Digital will train 1,500 new Microsoft-certified engineering professionals to augment our existing force of 800 Microsoft-certified engineers. This means we have more Microsoft certified professionals than any other company, including Microsoft. These commitments will be supported by the cross-licensing of patent portfolios, engineering cooperation, and aggressive joint marketing and field engagement.

This truly is a powerful story for customers, most of whom already have UNIX, MVS or OpenVMS servers and want to take advantage of Windows NT in the enterprise. We are uniquely positioned to enter into this alliance. While our competitors position one option against the other, Digital can offer customers 64-bit UNIX, OpenVMS and Windows NT products and services in an integrated environment.
Digital is already implementing previously announced programs to integrate OpenVMS with Windows NT.

This exciting agreement is another important step in a long and mutually beneficial relationship between our companies.

Sincerely,

Robert B. Palmer
Chairman of Board
President & Chief Executive Officer

Alliance
Highlights

Digital Equipment Corporation's strategic alliance with Microsoft Corporation combines Microsoft's client/server products with Digital's broad range of enterprise solutions. As a result of the alliance, the two companies will deliver a comprehensive set of information technology products and services and provide field support so that customers will be able to more easily integrate Windows, Windows NT-based, UNIX-based, Open VMS-based and maintenance based business solutions into the most complex business environments.

The following are other highlights of the DIGITAL-MICROSOFT alliance:

Microsoft will provide substantial funding in Digital's support and systems integration businesses that are focused on Microsoft-based solutions;

Digital will train no fewer that 1,500 new Microsoft-certified engineers. This complements Digital's existing 800 Microsoft-certified engineers. Digital now has the largest group of Microsoft certified engineers in the world;

Digital will deliver new Alpha-based Windows-NT systems to extend the range of existing Digital systems that support Windows NT;

Microsoft will release server software simultaneously on Alpha and Intel systems and client software simultaneously on Alpha and other RISC systems;

Digital and Microsoft will work together to maximize Alpha performance on key products;

Microsoft will license Digital's clustering technology and include it as part of the Microsoft clustering solution to accelerate deployment of common clustering technology on Windows NT Server;

Microsoft will help Digital make OpenVMS the best integrated system with Windows NT, and will recommend it to their high-end Independent Software Vendors (ISVs), and Digital and Microsoft will implement joint marketing and field engagement activities. More details about these activities will become available in the next several weeks.

ALLIANCE FOR ENTERPRISE COMPUTING
BACKGROUNDER

OVERVIEW:

Digital and Microsoft combine strengths to bring Windows-based solutions to the Enterprise.

Alliance for Enterprise Computing Combining Complementary Strengths.

Microsoft

- Leading vendor of Client-Server software and applications
- One application programming interface and user interface for Client-Server software and applications
- Industry-leading ISV support for Microsoft Win32-based Client-Server applications - Unified OLE-based object strategy with greatest ISV support.

digital™

- Leading multivendor software connectivity and services for all enterprise systems including: MVS, OpenVMS and UNIX - Global reach of award-winning enterprise deployment, services, support and system integration
- Leading Client-Server products extend availability, integrity, performance and scalability to the highest levels of the enterprise - Broadest range of Windows-based systems, Intel and Alpha, for volume and value
- Enterprise-level integration of Win32 and object technologies.

Digital and Microsoft have established a formal alliance to provide a complete set of Information Technology (IT) products, services and field support to meet the needs of enterprise customers.

Microsoft and Digital customers worldwide will be the first to benefit from this next wave of Windows-based enterprise solutions.

Customers in mid-size and large companies are striving to combine the best aspects of Client-Server technology with the higher level of service and support required in complex organization-wide solutions.

Distributed Client-Server solutions bring customers the advantages of application availability, productivity, low cost, and flexibility.
Customers are increasingly looking to Windows-based systems to play alarger role in their businesses.

Microsoft Windows-based products have become the industry focus of Client-Server environments. Through leading-edge technology and Independent Software Vendors (ISV) support, Microsoft systems are now the most extensive Client-Server solutions available.

Enterprise customers have additional requirements to implement organization-wide solutions, which are widely distributed, of enormous scale, and require highly responsive service, support and systems integration. These solutions also need to work with existing multivendor environments.

Digital is the leader in providing the enterprise platforms, software, support services and global reach that scale to any enterprise requirement. Digital expertise and experience is attuned to enterprise requirements in complex, multivendor system environments.

Customers Benefit Today

Customers can leverage the complementary corporate technology, services and business strengths of the two companies to provide the complete solution required by enterprise customers.

- Windows-based Solutions

 Customers can deploy Windows-based solutions with confidence that they can be integrated into even the most complex enterprise environments.

- Maximize Existing Investments

 Customers can leverage existing IT investments in systems, software and networks while gaining the next wave benefits of client- server business applications.

- Single Focus for Comprehensive Support

 Customers can rely on Digital as a single point of support for global deployment, management, support, systems integration and service of enterprise computing solutions.

- End User Productivity

 End users can access all corporate resources from their familiar Windows interface.

Delevering Real Value

Digital and Microsoft are aligning resources to deliver real value for enterprise customers in three key areas:

- Service, Support, and Systems Integration
- Products and Technologies,
- Joint Customer Activities

Service, Support, and Systems Integration

Both companies fund major expansion of Digital's capability to support Microsoft-based solutions.

Customers can now implement Windows-based solutions with the assurance of global support through the combination of Microsoft Client-Server products and Digital's leadership in networking services, systems integration, deployment and support of Client-Server environments.

Microsoft and Digital will accelerate the expansion of Digital's worldwide Multivendor Customer Services and systems integration businesses by funding 1,500 new Microsoft certified engineers at Digital in addition to Digital's existing 800 Microsoft certified professionals. Digital will field the largest group of Microsoft certified engineers in the world.

Enterprise customers can immediately benefit with the following new or enhanced offerings:

- On-site and remote support from Digital's Expertise Centers, local service offices in more than 100 countries, and 29 Microsoft Authorized Support Centers -- more than any other Microsoft Solution Provider.
- Help Desk Service offerings for end-users and MIS professionals that cover Microsoft client- server technologies with three levels of support: User Application, Professional, and Premium with 24x365 coverage.
- Global product deployment and asset management services via the Microsoft Select Program and Digital's POLYCENTER Assetworks solution to help customers control and manage software and hardware assets throughout the enterprise.
- Technology Migration Services for Windows 95, which include: assessment, planning, migration and on-going support.

Focused, specialized system integration expertise in industry, project and configured solutions through expertise centers worldwide.

Microsoft and Digital will further cooperate to meet the needs of enterprise customers through Microsoft's selection of Digital for the Launch Support Team of Windows 95 in the United States, and for the Enterprise Migration Program, which assists resellers in successfully migrating corporate customers to Windows 95 and Microsoft Office for Windows 95.

Products and Technology

Microsoft and Digital engineering organizations are cooperating to meet the needs of enterprise customers. This effort includes:

Digital engineering personnel are on-site at Microsoft's Redmond Wash. campus, directed by a joint management committee. These engineering resources are focused on Alpha-related Microsoft product engineering and joint integration development work.

Microsoft assists other Digital engineering and service groups through access to source code and technical consulting services for their Digital engineering work.

Microsoft and Digital have cross-licensed their respective patent portfolios. This allows both companies to freely engineer solutions for customers using the best intellectual property in the industry.

Engineering resources and cooperative efforts are focused on four areas:

- Windows NT on Alpha Systems

 Digital and Microsoft are fully committed to Windows NT on Alpha Systems. Digital offers Alpha-based Windows NT systems to extend the performance, expandability and scalability of Intel-based systems from Digital and other vendors.

 Microsoft's commitment to Alpha results in:

 - Microsoft BackOffice and other server software will be released simultaneously on Alpha and Intel systems.
 - Microsoft Office and other client software will be released simultaneously on Alpha and other RISC systems.
 - Microsoft and Digital are collaborating to maximize Alpha performance on key products. An example is the latest Microsoft SQL Server benchmarks on Alpha -- the best price/performance in the industry.

 Digital will soon be introducing a family of Alpha-and Intel-based systems specifically optimized for Windows NT.

- Microsoft Licenses Digital Cluster Technology

 Microsoft has licensed Digital's cluster technology for Windows NT and is incorporating it into Microsoft's future clustering solutions. Cluster technology will enable a set of Windows NT systems to act as one. Digital is the industry leader in the development of cluster technology -- Digital cluster technology for Windows NT won the "Best Technology of Show" award at COMDEX.

 By including this technology for Windows NT Server, Microsoft is accelerating acceptance of Windows-based solutions into a wider segment of the industry.

 Digital will introduce its initial version of Windows NT clusters into the market first and will converge on the common Microsoft solution when it is released. Digital will ensure that early users can easily move to the Microsoft Windows NT product.

 Digital has extensive expertise in the support and installation of cluster systems. As the developer of cluster technology, Digital is the leader in providing these support services. Digital is also extending these services to support Windows NT cluster customers.

- OpenVMS Integration with Windows NT

 On May 8, 1995, Digital and Microsoft announced plans to integrate OpenVMS with Windows NT. Microsoft will help Digital meet its commitment to make OpenVMS the industry's most integrated system with Windows NT by providing access to source code and engineering
 consulting resources.

 The seamless integration of OpenVMS with Windows NT will enable OpenVMS customers to combine proven enterprise strengths of OpenVMS with the new foundation of Windows NT applications.

 This integration also will enable the creation of new Windows-based solutions with the very high-end attributes of OpenVMS. These include true 24x365 availability, disaster tolerance, and scalability to theworld's largest clusters.

 Digital's expanded integration efforts include:

 - Applications support: Win32, OLE, MFC and other WOSA APIs on OpenVMS; OpenVMS API access from Windows NT; integrated LAN services; ObjectBroker, COM/OLE, DMQ, TCP/IP, and DCE available on both OpenVMS and Windows NT.

 - Data and System Management: printer and queue management; make OpenVMS manageable from Windows NT; common cluster APIs for applications on OpenVMS.

 - Integration of OpenVMS with Microsoft BackOffice: BackOffice APIs on OpenVMS, OpenVMS server component for BackOffice.

 - New OpenVMS features to extend Windows NT: new log structured file system, with client on Windows NT, and server on OpenVMS to automatically provide Windows NT applications with still higher availability and scalability; 64-bit support services; kernel threads.

- Integration of Mail Products

 Microsoft and Digital have exceptional and complementary products to address enterprise requirements in electronic mail.

 Microsoft is supporting Digital's integration of ALL-IN-1 and MailWorks products with Microsoft Exchange Server and clients. This will enable the five million users of ALL-IN-1 and MailWorks to easily use and/or access Microsoft Exchange Server functionality. Digital's mail backbone will give Microsoft Exchange users access to other mail environments.

 Digital's enterprise mail backbones will embrace Microsoft Exchange Server, as groups within Digital adopt Exchange-based applications.

 Digital will extend its industry-leadership enterprise mail customer support services to Exchange.

Digital UNIX Interoperability with Windows NT

Where customers have a clear requirement for or substantial investment in a UNIX infrastructure and need to encompass Microsoft technologies, Digital UNIX combined with Windows-based solution is an obvious choice.

Digital is an industry leader in multivendor integration of UNIX systems in the enterprise. Digital UNIX provides customers with the most complete interoperability with Windows-based environments and provides them access to 64-bit applications that take advantage of the large memory addressing and performance of the Alpha architecture.

Digital UNIX provides:

- Out-of-the-box interoperability between Windows and Windows-based solutions and UNIX.
- Enterprise security, system management and storage management.
- Object interoperability via COM/ObjectBroker
- Win32 API support

ISV Recruitment

Applications availability is a key reason for the wide acceptance of Windows-based solutions in the enterprise. Digital and Microsoft are jointly targeting key ISV application providers to expand the enterprise solutions portfolio.

Microsoft and Digital together are recruiting current Windows NT ISVs to ship their products on Alpha systems.

Digital is encouraging ISVs for OpenVMS to focus development of new enterprise applications using Win32, OLE and other WOSA APIs. This will enable them to deploy new applications on both OpenVMS and Windows NT platforms.

For targeted three-tier applications, Microsoft and Digital will encourage ISVs to use Win32 APIs on OpenVMS to obtain such enterprise capabilities as 24x365 operation support, disaster tolerance, and the greatest cluster scalability.
Development kits for the integration of OpenVMS with Windows NT environment are under development, by Digital and others. Tools will first be available from Fort, Inc.

Joint Customer Activities

Strong field implementation and joint marketing will ensure coordinated customer delivery of the service, support, systems integration and products outlined above. Enterprise customers require this coordination to deploy and depend on widely distributed Client-Server solutions.

Rollout of joint activities has already begun in the field, building on existing programs:

- Joint customer seminars have begun in Japan, Brazil and other locations world-wide.
- Trade show activities such as Networld+Interop.
- Demos such as at ObjectWorld.
- Joint advertising planned for the fall will cover Windows 95, Windows NT, integration and services.
- Windows NT, UNIX interoperability pavilion at UNIX Expo.
- Cross-training of both companies' sales forces is planned. It will cover Microsoft products and Digital service, support and systems integration Services and complementary enterprise system and software products. Digital also will establish Microsoft Competency Centers worldwide to support customers implementing enterprise solutions with Microsoft and Digital products. The first center will be established in the Seattle WA area.

Joint Field Engagement

Both companies will commit local field personnel and world-wide regional management to work jointly to engage major customers.

Regional field managers for each company will manage the local implementation of joint marketing plans. They will designate Digital and Microsoft people to work together at the local level.

Each quarter, a Microsoft and Digital corporate-level marketing and sales committee will meet to manage and direct joint field activities.

Summary

Microsoft and Digital are focusing resources to bring customers the benefits of the next wave of enterprise computing. Customers will benefit by integrating the best Windows-based solutions in a complete,
dependable enterprise environment, with comprehensive, global support.

For more information contact local Microsoft and Digital sales offices or consult the companies' home and interest pages:

http://www.microsoft.com	**Microsoft Home Page**
http://www.digital.com	**Digital Home Page**
http://www.windowsnt.com	**Digital and Windows NT**
http://www.microsoft.com/ntserver	**Windows NT server**
http://www.microsoft.com/ntworkstation	**Windows NT station**
http://www.microsoft.com/backoffice/mbo00000.htm	**BackOffice**
http://www.microsoft.com/sql	**SQL server**
http://www.microsoft.com/SMSmgmt	**SMS server**
http://www.microsoft.com/SNA	**SNA server**

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BUSINESS QUESTIONS AND ANSWERS
The Alliance

Q. Why is Digital forming this alliance with Microsoft?

A. Digital is a major player today with Windows in the enterprise. Windows-based solutions are clearly the next wave in the enterprise, and estimates from industry analysts indicate that it will be a key environment in the next few years. Digital intends to be the major player as customers extend their compute resources to include Windows-based solutions at all levels. This alliance will open large new business opportunities for Digital and its partners.

Q. Why is Microsoft forming this alliance with Digital?

A. Customers are deploying business solutions based on Windows and Windows NT Workstation in overwhelming numbers on the desktop, and are deploying Windows NT Server as a network and application server. Customers are looking with great interest at Microsoft BackOffice. They want to be able to deploy these systems and know they can be integrated with the entire enterprise, no matter how complex. Digital's global reach in service and support and systems integration, and its complementary product lines, make the alliance a natural one.

Q. What are the important things that this announcement provides to customers today? How does it differ from other announcements?

A. Major funding by Microsoft of Digital's expansion of its service, support, and systems integration capabilities. Commitment by Digital to train 1500 MCSEs in 24 months -- by far the most of any company in the world. Commitment of Microsoft products on Alpha-based systems. Engineering cooperation including Digital engineers on site at Microsoft Licensing of Digital clustering technology by Microsoft. Cross-licensing of patent portfolios. Joint marketing and field engagement.

Q. To be successful, this announcement will require close coordination of the field at the district and regional levels. How will you make this work successfully?

A. First, Microsoft and Digital have worked on a number of successful engagements around the world -- Best Buy and Saturn are just two examples. Some field organizations are already quite comfortable working with each other. Other field organizations do not have as much experience, and we'll need to build those relationships. In the course of the next 60 days, Digital and Microsoft will develop a formal business plan for implementing the alliance. From a business and sales perspective, this plan will have three major facets:

Development of formal rules of engagement Plans and timetable for cross-training of field sales forces Plans and timetable for initial joint marketing programs.

Q. How will you prevent conflict with each other? Specifically, how will you keep each other from trying to sell a competing product to a customer?

A. The rules of engagement will be formalized, and everyone in the field on both sides will know them. But the concept is straightforward and well-understood in the industry. If Microsoft brings in Digital to an account, Digital cannot attempt to sell a competing solution unless the customer specifically requests it. If Digital brings in Microsoft to an account, Microsoft cannot attempt to sell a competing solution unless the customer specifically requests it. There will be a formal escalation process at the district and regional level, going all the way up to corporate if there is a need. No doubt we'll make some mistakes along the way, but both companies have experience working with different partners, and we'll resolve any issues as they occur. Both are committed to work together to provide the best joint solution for the customer.

Q. Specifically, how will you handle conflicts with other partners?
Is Digital now Microsoft's preferred partner, or conversely, is Microsoft now Digital's preferred partner?

A. Nothing in this alliance requires either company to use the other in a particular sales situation. Both are free to make the best decision based on their customer's needs. However, in the enterprise market, both Microsoft and Digital believe there are many synergies between them in product and services, and the joint funding of 1500 new MCSEs at Digital is intended to provide a large worldwide resource on which Microsoft sales people can call. Both companies expect a significant number of new, joint engagements to result.

Q. Will the Microsoft sales force be goaled on Alpha sales?

A. Microsoft sales people are not goaled on hardware sales, but rather systems and application software sales. This alliance will help them meet and exceed their goals.

Q. Will Digital sales people (or its partners) sell the full complement of Microsoft applications?

A. Digital is a major reseller of Microsoft applications today. Our customer service organization sells, deploys, manages and supports all applications, but it is focused on applications used by enterprise customers.

Q. You have mentioned that Microsoft is providing funding to Digital.
How much funding? Is it an equity position?

A. Microsoft and Digital are jointly funding the development of the infrastructure to accelerate Digital's delivery of Microsoft-based solutions. The level of funding is not public information. The investment does not represent an equity position of Microsoft in Digital.

Q. Is it more than $1 million? Less than $100 million?

A. It is by far Microsoft's largest funding effort to assist a partner in deploying sales, service and support resources.

Q. Will this relationship bring Digital into the orbit of the Department of Justice investigation of Microsoft?

A. We see no reason for it to. The relationship is in no way exclusive. The companies remain separate entities, etc. The companies are merely strengthening and broadening a general business relationship. That's all.

Q. What kind of increases in sales volume do you see (Mr. Gates, Mr.Palmer) as a result of this agreement?

A. Incorporating Windows into the enterprise offers the biggest new opportunity for desktops, servers, and services of the decade. We expect to benefit in a big way from this alliance.

Q. Wouldn't it make more sense for Microsoft to team with HP rather than Digital? They have more momentum, and you have a strong relationship with them.

A. Microsoft and Digital have a long-standing business and technical relationship. This alliance naturally builds on it. Microsoft also has a relationship with HP that is not affected by this alliance. Microsoft will continue to work with the HP division that is focused on Windows and Windows NT.

Q. This event seems to have been organized hastily. Why are you doing it now?

A. This new alliance builds on the many efforts Digital and Microsoft have made over the years to jointly meet customer needs. We have formed the alliance, and this is the appropriate time to make our plans public. You will see more detail on some of the programs that come out of the alliance in the future.

Q. Why was Digital's name not included in the initial media alert about the event? Was something going on?

A. Digital's earnings release was scheduled for Tuesday; this announcement was scheduled for Wednesday. Rather than take the chance of starting speculation about what the announcement meant, the companies decided to send out an initial media alert under Microsoft's name so the press and analysts could get the event on their schedules. When the market closed Tuesday, the alert was repeated with both companies' names.

Business Questions and Answers
Enterprise Services

Q. Will Microsoft continue to offer Product Support Services which compete with the Digital Service Offerings?

A. Microsoft's business strategy has always been to provide a range of support to corporate customers and work with other major service providers such as Digital to extend its capabilities. Microsoft Product Support Services offers a full complement of service offerings to customers, ranging from simple telephone support to its Global Premier Support for multinational customers. Digital is one of three worldwide Authorized Support Centers for that Digital can offer to complement the Microsoft support services.

Q. Will Digital compete with HP for Microsoft Services business?

A. Digital and HP already have support businesses built around Microsoft solutions. This alliance gives Digital the opportunity to further differentiate its Microsoft-focused service, consulting and integration businesses, giving customers a strong reason to shop Digital.

Q. Will Digital be cutting services investments in other areas to support this agreement?

A. No. Under the terms of this agreement Microsoft will assist Digital to rapidly expand its expertise worldwide on Microsoft enterprise software, which will complement their other areas of multivendor expertise.

Q. How many new hires will be needed to support the services and systems integration center?

A. Digital will certify 1,500 engineers (MCSEs and MCSDs) within the next two years.

Q. How broadly will the Microsoft sales force be trained on selling Digital Services and in what time-frame?

A. The entire worldwide Microsoft sales force will be trained within the next 6 to 9 months, based on the formal business plan.

Q. How has the relationship been expanded or improved as a result of this alliance?

A. The investment made by Microsoft and the joint field engagement commitments uniquely position Digital's Multivendor Customer Services in the industry.

Q. How is this new alliance with Digital different from other Microsoft Global Support Centers, MS Solution Providers, and other partnerships such as Wang and Vanstar?

A. This creates a new level of alliance between the companies that results in Digital having the largest population of MCSEs and MCSDs in the world. The joint sales, marketing and services that both companies are committed to are greater than any other alliance that either has today. Nothing in the alliance is exclusive. Simply no other Microsoft partner has stepped up to the level that Digital has in the business, technical, and service/support opportunities.

Business Questions and Answers
Product/Technology

Q. Does Digital see Windows NT as a mission-critical o/s?

A. The term "mission-critical" means different things to different users. Windows, Windows NT and other operating environments are mission capable to many users today. Digital is in the best position in the industry to integrate today's systems, including MVS, UNIX, OpenVMS and others, and to deploy Windows solutions where they best meet customer needs.

Q. Why is Digital giving its cluster technology to Microsoft?

A. Let's be clear. Digital is licensing its Windows NT-based cluster technology to Microsoft. Customers require reliability, salability and performance. Digital is the leader in this technology and this base technology incorporated into Windows NT will dramatically expand the market opportunity for both companies. Digital will also continue to enhance its offerings with features that customers want.

Q. Is this end-of-life for OpenVMS?

A. No. In point of fact the tight integration with Windows NT allows the OpenVMS product to specialize in the areas where it excels - very high availability, data integrity, scalability and security. The implementation of client server computing environments is driving the needs of large enterprise customers in these areas. OpenVMS, combined with Windows NT delivers a superior solution in a growing market segment.

Q. Is Digital handing the OpenVMS customer base to Microsoft? Isn't Microsoft's real plan to grab the ten million enterprise customers now using OpenVMS?

A. No. Digital's customers already have Windows installed on the desktop and many now have Windows NT servers. They are looking to provide the breadth of applications and familiarity of the Windows environment coupled with the robust, secure features of OpenVMS and its applications. We see the combination of OpenVMS with Windows NT as a great way for these customers to augment their current 24x365 environment with Windows NT's foundation for business applications. In fact, it opens new market opportunities for Digital.

Q. In April you made a big deal out of your new high-end systems for the enterprise and the large memory capability of Alpha. Will OpenVMS or Windows NT support memories over 4Gbyte in the near future?

A. Alpha is a 64-bit architecture and OpenVMS will have 64 bit support late this calendar year or early in 1996. Microsoft has made no commitment to date for 64-bit support on Windows NT.

Q. Will Digital's major database partners be supporting this new three tier model incorporating Windows desktops, Windows NT application servers and OpenVMS enterprise servers?

A. Digital's database partners support a three-tier architecture right now. Many customers use Windows on the desktop as the entry point into the environment, an application server in the center, and a database engine at the top layer. The alliance enhances the opportunities for customers to solve their problems. Microsoft SQL Server was designed with a Client-Server architecture and is already able to integrate into a two or three-tier environment today.

Q. Your enterprise partners (SAP, Oracle, CA, etc.) are primarily committed to UNIX at the enterprise and applications level. How will this match their strategic thrusts?

A. Digital is committed to supporting our partners with the best products in the industry. Our superior interoperability lets our customers build computing environments which include the applications, servers and desktops which best meet their business needs. Our applications partners have confidence that we will help them provide customers with the best solutions in the industry. Furthermore, all of these vendors have products deployed on Windows NT Server.

Q. Is there a plan to support Microsoft Exchange on UNIX platforms?

A. No. Digital customers will access Microsoft Exchange in UNIX environments using Digital's leading interoperability tools and mail backbones. Microsoft Exchange Server will come with a variety of gateways and other interoperability features.

Q. Will Digital drop ALL-IN-1 once Microsoft Exchange becomes available on Alpha?

A. No. Microsoft will support Digital's development of interoperability between ALL-IN-1 and MAILWorks and Microsoft Exchange so that the millions of Digital users can easily use Exchange.

Q. IBM has made it clear that it will make Lotus Notes available on most industry platforms. Will it be available on Alpha? How would Digital differentiate it from Exchange?

A. Thousands of applications have been ported by ISVs to Alpha. If Lotus wishes to port Notes to Alpha, Digital will provide the same support that we provide for any ISV porting an application to Alpha. In terms of differentiation, through this alliance Microsoft has made a major commitment to deliver Exchange on Alpha simultaneously with their Intel version.

Q. Is this relationship a hurried response to the IBM/Lotus deal?

A. This is a strategic alliance which builds on the long-standing relationship Microsoft and Digital have. Digital and Microsoft announced last spring their increased cooperation on integration of OpenVMS and Windows NT, and Digital's support of Windows NT on the desktop and application server level. Today's announcement builds on and broadens that relationship. Digital expects to be the premier provider of Windows-based computing in the enterprise. Digital and Microsoft will continue to enhance the service, software and support we provide to customers, and to deliver the systems and applications they need to meet their business needs.

Q. Digital seems to have missed the chance to sign a major vendor for its Alpha architecture. Is this an attempt to validate Alpha?

A. Digital has shipped more than 100,000 Alpha systems, the fastest ramp of any major architecture. This enhanced relationship will expand the reach of Windows further into the enterprise and it will accelerate an already highly successful growth in Alpha systems sales.

Additional text for Microsoft's response:

Microsoft is committed to support the major high-performance chip architectures, and Alpha is one of those four today.

Q. How does Digital's Intel-based systems business fit into this?

A. Digital's Intel-based systems are an integral part of our enterprise strategy. Our Intel and Alpha desktop and server systems give the most complete price/performance range in the industry today.

Q. Is Microsoft teaming up with Digital (OpenVMS) as part of the attack on UNIX? Aren't you just trying to kill UNIX?

A. No. The focus of our teaming with Digital (Digital's OpenVMS) is to address the enterprise needs of our mutual large customers. (Due to the great affinity between OpenVMS and Windows NT many of these customers have begun to look toward the combination of the two.) Windows NT addresses a wide market where UNIX is an important factor and Windows NT coexists well with it. Obviously, there are markets where Windows NT and UNIX compete head-to-head. This competition is good for customers. But where customers choose UNIX, or have it on existing systems, Microsoft is committed to interoperability. The Digital alliance is a good example of how we can improve that integration.

Q. You've been saying Windows NT is mission-critical capable, but now you say it requires OpenVMS for Mission Critical applications. Are you saying that Windows NT isn't Mission Critical?

A. Windows NT meets the mission-critical needs of many customers. By any technical measure, it has the performance and reliability to meet or exceed customer requirements for business applications. The combination of OpenVMS with Windows NT extends the range of "mission critical" applications and environments that can be addressed with NT. OpenVMS extends the range of functionality nto areas that NT doesn't address, like 24x365 operation, disaster tolerance and multi-site clustering. OpenVMS has an established track record for mission critical applications for many years. Windows NT is a solid, dependable system with a large application based and great server support for Windows 95 desktop applications. It's the combination of strengths that makes the OpenVMS with Windows NT solution so powerful.

Q. What are the real products behind the Windows NT/OpenVMS integration strategy?

A. The foundation products for Windows NT/OpenVMS integration are in place today - in fact leading edge customers are implementing today. Digital and Microsoft are cooperating to incorporate the Win32, OLE, MFC and other WOSA technologies on their systems. And the key components of 3-tier client server computing in the areas of middleware (ObjectBroker, DCE, DMQ, TCP/IP), and Application Development (Fort, Entera, DECadmire), are areas where functional and proven products exist today. Our efforts will be focused on expanding the integration and simplifying the buying and implementation of the OpenVMS with Windows NT environment.

Q. When and where will Digital and Microsoft recommend their respective products (OpenVMS and Windows NT) over the other? Especially when would Digital recommend Microsoft products and Microsoft recommend Digital products?

A. Digital has already announced a strategic direction in which it recommends Windows and Windows NT Workstation on the desktop, and Windows NT Server and OpenVMS on the application server; Digital is recommending new development be focused on Windows NT Server on the second tier, and OpenVMS on the third tier. Microsoft supports this approach, recommending the use of OpenVMS where the requirements are for extremely large database requirements, very high availability requirements like 24x365 operation, multi-site clustering and/or disaster tolerance. Today's announcement focuses on mission critical enterprise environment. In the application space, we see Windows NT and OpenVMS integration as being key components of the overall solution.

Q. Does this announcement represent a new business endeavor for Digital?

A. No. Digital was one of the first, major hardware vendors to embrace Windows NT with the announcement of the first Alpha systems in May 1993. Today Digital is already the leading provider of worldwide training and the largest, worldwide service provider for Microsoft products. This announcement builds on that momentum in the marketplace.

Q. Why is Digital licensing its technology for Windows NT clusters to Microsoft?

A. Digital feels that licensing its cluster technology to Microsoft will cause rapid market formation. Digital is eminently positioned to satisfy the increased demand this will create for the industry's most scaleable range of hardware platforms. Further, Digital has the most experience providing tools, services, and support to customers deploying business critical systems on Windows NT.

Q. Digital has made quite a bit of noise about clusters, on both OpenVMS and UNIX, providing high levels of scalability and availability. Is the technology that is licensed to Microsoft the same technology used in OpenVMS or UNIX clusters?

A. Let's be clear. Digital is licensing its Windows NT-based cluster technology to Microsoft. Digital has a clear and very substantial market lead in cluster technology, and a very strong understanding of what customers expect from clusters. This is one eason why Microsoft chose to license our NT cluster technology.
The features and capabilities of our clusters include many common elements among the operating systems, but the underlying technologies differ somewhat. Neither UNIX nor OpenVMS technologies are involved in this technology transfer.

Q. How do both companies see bringing clusters capabilities to market?

A. Digital will bring clusters to market as a layered product. Microsoft intends to incorporate this technology in future versions of Windows NT Server.

Q. When will Windows NT clusters be available?

A. Digital will have a first version of Windows NT clusters in field test this winter. Microsoft will be incorporating clusters into future versions of Windows NT Server. Microsoft will announce delivery dates later.

Q. Will Digital's initial version of clusters support all Windows NT platforms?

A. The initial version will support both the Intel and Alpha platforms. Other platforms will be evaluated on the merits of each individual business case. Microsoft will deliver hardware-neutral support in its product.

Q. Will Digital and Microsoft jointly market clusters capabilities?

A. Digital will initially sell its own version of clusters while collaborating on the transfer of technology to Microsoft. When Microsoft brings its own version of clusters to market based on this technology, Digital will migrate existing customers to the new base version and cease selling its own layered product. Digital will offer layered tools and services that work across versions of clusters.

Q. How will Microsoft and Digital insure compatibility across versions?

A. As part of this alliance, Digital and Microsoft will continue close technical collaboration to insure compatibility.

Q. Should ISVs working with Digital on building cluster-aware applications wait?

A. No. Close technical collaboration between Digital and Microsoft, plus Digital's commitment to migrate existing customers, means that developers who are now working with Digital on building cluster-aware applications can be confident that their designs will be compatible with future Microsoft systems.

Business Questions and Answers
Digital and UNIX

Q. Where does UNIX fit in Digital's enterprise computing plans?

A. Digital UNIX is a strategic, 64-bit operating system. We have the best interoperability with the Windows environment in the industry today, and we will continue to expand that position. Digital UNIX offers customers access to large, fast database engines, very high performance technical computing resources, and high reliability. It is ideal for commercial and technical environments where applications call for Windows applications to interoperate with UNIX.

Q. Why would a customer select UNIX over the OpenVMS/NT combination.

A. There are several reasons, each driven by a real customer requirement. First, customers have large investments already in UNIX applications, systems and the data these systems contain. Next, there are often policy or standards reasons why customers must use UNIX. Further, they may require an application that is available only on UNIX. In such cases, Digital offers the best interoperability with Windows environments in the market and Digital UNIX is the only full 64-bit environment available from the $5K desktop to the supercomputer.

Q. Will Digital and Microsoft be providing the same level integration between Digital UNIX and Windows as it plans to with Open VMS?

A. Digital has the leading set of interoperability tools for UNIX. They provide the best Windows/UNIX computing environment customers can get now. Working with partners, we offer customers the application integration tools they need to run WIN32 applications on Digital UNIX today.

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ALLIANCE

Background

Digital and Microsoft have worked closely together since 1984. There are many aspects of the Digital/Microsoft Alliance. Products and services from both companies provide customers with complete, reliable, enterprise solutions. The Alliance brings together Microsoft's vision of "Information At Your Fingertips" and Digital's ability to provide solutions that are "Delivered and Supported Throughout the Enterprise." Combining Digital's enterprise expertise with Microsoft's desktop expertise results in a unique partnership that can assist customers in implementing mission-critical, client/server solutions.

Enterprise Platform Solutions

- Digital platforms support the entire range of Microsoft products
- Digital AlphaStations and AlphaServers (RISC platforms/PCI-based) support Windows NT Workstation, Windows NT Server, and the Microsoft BackOffice family which includes Microsoft SQL Server, Microsoft SNA Server, Microsoft Systems Management server and Microsoft Mail Server (and the upcoming Microsoft Exchange Server)
- Digital PC (x86 based) desktops and servers support Windows NT Workstation, Windows NT Server and the Microsoft BackOffice family
- Digital PC (x86 based) desktops and servers supports Microsoft Windows, Windows For Workgroups and the upcoming Windows 95
- Digital is an OEM of Microsoft products from Windows 3.1 to Windows NT and soon, the Microsoft BackOffice family

Enterprise Support Services

- Digital is a worldwide Microsoft Authorized Support Center (ASC) with 29 support centers worldwide supporting 450 field locations in over 100 countries
- Digital is a worldwide Microsoft Technical Education Center (ATEC) and is the largest Microsoft training partner having trained over 20,000 customers
- Digital was selected as one of the Microsoft Authorized Support Centers (ASC) for the Windows 95 Support Launch Team
- Digital has over 20,000 service professionals worldwide, including 500 Microsoft Certified Professionals, and over 5,000 Support Professionals trained on Microsoft products
- Digital is a Microsoft Large Account Reseller (LAR) supporting the Microsoft Select Program in the following areas: United States, Canada, Europe and the Asia
- Digital was the first worldwide provider of Microsoft product maintenance and update services
- Digital provides systems integration and consulting services and works jointly with Microsoft Consulting Services to deliver a total solution to the customer
- Digital was selected as the consulting and services company to manage and support the worldwide client/server infrastructure for Microsoft's upcoming on-line service, The Microsoft Network

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Cooperative Product Development

- Over the past 10 years Digital and Microsoft have engaged in cooperative product development efforts from Digital PATHWORKS and Microsoft LAN Manager, to Microsoft Windows NT on Digital Alpha platforms
- Cooperative product development of the Microsoft BackOffice family on Digital Alpha platforms which includes Microsoft SQL Server, Microsoft SNA Server, Microsoft Systems Management server and the upcoming Microsoft Exchange Server
- Over 400 Digital Alpha systems are being utilized in Microsoft Product Development Groups for development, optimization, and testing
- Digital's POLYCENTER AssetWORKS has been integrated with Microsoft's Systems Management server to extend systems and configuration management functions to include systems running OpenVMS, DEC UNIX, SunOS, Solaris, IBM AIX, and HP-UX
- Microsoft Visual C++ for Digital Alpha platforms has been, and will continue to be, a joint product development and maintenance effort between Digital and Microsoft
- Joint development of the Common Object Model (COM), which will integrate the leading object technologies: Microsoft's Object Linking and Embedding (OLE) and Digital ObjectBroker (which is based on the Object Management Group's (OMG) Common Object Request Broker Architecture (CORBA) specifications).
- Development of the Open Software Foundation's (OSF) Distributed Computing Environment (DCE) for Windows NT with Digital DCE for Windows NT which provides a complete, interoperable set of services that supports a distributed computing environment
- Development of Digital POLYCENTER Manager on NetView for Windows NT which provides enterprise network management functionality with automatic discover and bi-directional integration with Microsoft Systems Management server
- Digital is developing Digital Clusters for Windows NT which will provide high-availability and transparent failover in a Windows NT Server environment. This is an example of a mission-critical enterprise function that Digital is bringing to Windows NT for both x86 and RISC platforms.
- Digital has worked with Microsoft to ensure that the entire range of Digital PC desktop and notebook systems support the industry standard for Plug and Play systems as well as the Microsoft Hardware Design Guide for Windows 95

Summary of Digital's Relationships with Microsoft

- Microsoft Solution Provider - Consulting Services - *Managed by Digital's Systems Integration organization*
- Microsoft Solution Provider - Worldwide Authorized Support Center - *Managed by Digital's Multivendor Customer Services organization*
- Microsoft Solution Provider - Authorized Technical Education Center - *Managed by Digital's Multivendor Customer Services organization*
- Microsoft Select Program - Large Account Reseller (LAR) - *Managed by Digital's Multivendor Customer Services organization*
- Microsoft OEM - *Managed by Digital's Computer Systems Division*

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"Microsoft is our most strategic partner today"

Enrico Pesatori
Vice President & General Manager
Computer Systems Division
Digital Equipment Corporation

"Digital has one of the largest worldwide maintenance and service organizations in the industry. They also have an excellent record for quality and dependability. By working together, we can greatly extend the services available for customers of Windows NT, Microsoft Office, and other Microsoft products."

Steve Ballmer
Executive Vice President
Sales and Support
Microsoft Corporation

"We've been watching with interest the growing relationship between Microsoft and Digital Equipment. What began in the 1980s as a simple OEM arrangement has become a strategic alliance of vital importance to both companies. Digital gives Microsoft entree into the enterprise computing realm and is applying advanced server technologies to Windows NT. Microsoft gives Digital high-volume platforms and new opportunities to leverage its worldwide support capabilities."

Windows Watcher

Alliance Quotes

For Digital, this [pact] gets them really in the front car of the NT train, which right now is gaining momentum. It really puts them ahead of other vendors like Unisys and AT&T GIS.

- Jon Oltsik
Forrester Research
Computerworld
Aug 6, 1995

For Digital, the deeper partnership with the software giant should boost the fortune of its Alpha systems, providing the company with a more solid footing on its comeback trail, industry analysts said.

- Computerworld
Aug 6, 1995

Analysts said the arrangement would go a long way toward bringing more market credibility to Digital's Alpha RISC chip.

- Dow Jones, Aug 2, 1995

The deal gives Digital Microsoft's 'most favored vendor status' in a lot of areas.

- P. Martin Ressinger
Duff & Phelps
quoted in Dow Jones
Aug 2, 1995

The NT game is up for grabs, and Digital has the opportunity to become a leader in what is a crucial market.

- Steven Milunovich
Morgan Stanley
The Wall St Journal
Aug 3, 1995

The magnitude of what we are doing here -- the clustering agreement, joint engineering, joint field teams -- is much bigger than what we have done in the past with other alliances.

- Bill Gates
Reuters, Aug 2, 1995

Microsoft decided to make a substancial commitment to DEC -- well beyond what anyone else has done before.

- Bill Gates
Reuters, Aug 2, 1995

The alliance announced by Microsoft Corp and Digital Equipment Corp got a thumbs up from analysts who see the deal helping both companies reach important goals more quickly than they could on their own.

- Reuters, Aug 2, 1995

It's a tight alliance.

- David Readerman
Montgomery Securties
Reuters, Aug 2, 1995

DEC gets to sell more hardware and Bill gets to move NT into the enterprise and start chomping at UNIX.

- David Readerman
Montgomery Securties
Reuters, Aug 2, 1995

The best of both worlds is a tough thing to pull off.

- Bill Gates
The Wall Street Journal

In 1995, an estimated 2,420,000 workstations and servers using Windows NT operating system will be shipped, compared with just 565,000 shipped last year. Of that 2,420,000, roughly 195,000 will be high-speed RISC platforms, nearly all of which will be Digital platforms.

- Rob Enderle
Dataquest
the Wall St Journal
Aug 3, 1995

The announcement also included an agreement by the two companies to cross-license all their patents, a move analysts viewed as particularly unusual for Microsoft, which closely guards its intellectual property.

- Laurie Winn (reporter)
The New York Times
Aug 3, 1995

No one company can provide everything that customers would want in enterprise technology...our customers have been asking us to get together and do this, and we're doing it."

- Bob Palmer
The New York Times
Aug 3, 1995

We're going to bring the strengths of both companies to bear on this.

- Bill Gates
The New York Times
Aug 3, 1995

The gains here are mutual. This is an opportunity for Microsoft to expand its reach into departmental servers, an area where DEC has traditionally been strong but has fallen behind.

- Robert Djurdjevic
Annex Research
The New York Times
Aug 3, 1995

Digital is still a second-tier player in UNIX. But the game for NT is just beginning. It's a good way for Digital to get out there and be a leader again.

- Steve Milunovich
Morgan Stanley
The New York Times
Aug 3, 1995

Microsoft wants very much to see Digital move Windows NT into the enterprise. [The investment] shows Microsoft is extremely serious about working with it.

- John Logan
Aberdeen
The New York Times
Aug 3, 1995

This cements the relationship between Alpha and Windows NT.

- Gary Helmig
Soundview Financial Group
Boston Herald

the plan is that Windows 95 ian interim solution until the average computer can run NT. There are shortcomings with DOS and Windows and Windows 95 but Windows NT is a more reliable operating system.

- P. Martin Ressinger
Duff & Phelps
The Oakland Tribune
Aug 3, 1995

The problem with Unix is that it comes in many flavors.

- Rob Enderle
Dataquest
The Oakland Tribune
Aug 3, 1995

Despite the ability of Windows NT, it hasn't moved as fast as people thought. It hasn't been more successful because Microsoft doesn't know how to address enterprise compung accounts.

- P. Martin Ressinger
Duff & Phelps
The Oakland Tribune
Aug 3, 1995

Windows NT is supposed to be an operating system used on a wide number of computers but Microsoft is ' annointing Digital as its most favorite vendor for these computers.

- Rob Enderle
Dataquest
The Oakland Tribune
Aug 3, 1995

This is all about the next wave of enterprise computing. We've got a major commitment from the top of DEC and a major commitment from the top of Microsoft to collaborate on this.

- Bill Gates
Worcester Telegram & Gazette
Aug 3, 1995

In another item close to DEC's heart, Microsoft last week also promised to bring the Alpha version of NT into great parity with NT-on-Intel by releasing Backoffice and other unidentified server software simultaneously on the two platforms, leaving Mips and PowerPC to bob along at their own speed.

- Maureen O'Gara
Client Server News
Aug 7-11, 1995

It's a wise move by both parties. The clustering software that DEC has developed over a number of years is extremely good. Why should Microsoft have to reinvent the wheel for something that's already there?

- Lynn Blackburn
MIS Director
Pine Co.
Computerworld
Aug 6, 1995

They've got a real partnership with the behemoth of the PC industry, and the industry is increasingly PC-oriented.

- Jonathan Eunice
Illuminata
Computerworld
Aug 6, 1995

Wu said he is bullish about Digital for the first time in five years and the strategic technological alliance of Digital and Microsoft makes him much more optimistic for the Maynard, Mass company's future

- Dow Jones, Aug 2, 1995

Gates knows his bread is buttered on the Intel side.

- Shao Wang
Smith Barney
The Wall St Journal
Aug 3, 1995

Digital-Micorosoft alliance and Harry Copperman
PCWeek Interview
SOURCE: PC Week
DATE: August 23, 1995

PC Week via First! : OK, with all the bandwidth that Windfall 95 is taking up, there isn't much room for really important announcements. Perhaps the most important one to have gotten lost in the folderol surrounding old Win95 is that DEC and Microsoft are actually entering into a truly joint commitment to NT.

The shallow analysis is: This is a wonderful deal for DEC. Maybe this finally gives NT enough oomph to be seen as a real competitor in server environments. And, finally, NT might actually transcend its image as a product for a customer and computing environment Microsoft really doesn't understand.

However, there's a lot more to it than that. One of the key issues from Microsoft's strategic perspective is not only to assess, but also to influence the coming change in computing beyond the desktop. Yes, if you look at things in the glass house, the fundamental role of the S/370 architecture hasn't ended. But there will be a switch to a more modern set of products over the next seven to 10 years, a switch forced by overwhelming real-life cost and capability pressures. Conservatively, it's a $1 trillionopportunity!

Microsoft, in my estimation, plans for the day when it can set the customers' strategic perceptions in the world of Big Iron, just as it does in desktops. IBM has held this role really since the beginning, but it is probably at its weakest point. Remember SAA? Look at its mainframe give-away pricing, at the number of Unix, NetWare, and NT boxes in those Dark Blue IBM shops. If you're Microsoft, now is the time to think about invading the Glass House.

So why is Microsoft so tight with DEC? First off, it's clear that Microsoft is none too fond of the Apple/IBM/Motorola PowerPC triumvirate.
Microsoft knows that, with the exception of the Mac OS, Windows NT is the only real operating system for the PowerPC. It doesn't take a rocket scientist, or even a recent college grad masquerading as an analyst, to figure that IBM and Apple would prefer something--anything--to Windows NT.
And in terms of long-range competitors to Microsoft's strategic core (operating systems), IBM and Apple, along with Novell, have to be viewed as primary threats.

Second, the one weakness that Microsoft truly has in the world of real customers is the perception that it's basically limited to activities below the small application server. If you want real, big system computing you go somewhere else. Now, we all know that IBM is the best-positioned of big system companies. But DEC isn't a bad No. 2. Yes, Hewlett-Packard is on a roll. But DEC is a more receptive partner and, in some ways, a simpler proposition. Microsoft can go up the learning curve with DEC.

By now even the Evelyn Wood speed readers have discerned that the common thread in this scenario is IBM. While the public feuding has died down, the strategic enmity between Microsoft and IBM is very real. Lou Gerstner may not be a propeller-topped engineer, but he's one heck of a tactician and strategist, and, believe me, he sees the long-term threat of Microsoft. And if Lou has figured this out, how many years ago do you think Gates, Maples, and Ballmer did.

Make no mistake. The DEC-Microsoft relationship isn't as simple as training some folks on NT. It's a defining alliance for the upcoming war for the computing dollar beyond the desktop, beyond first-generation data centers. IBM will battle fiercely to keep its business and, more importantly, its strategic control of what happens beyond the desktop. But Microsoft recognizes its imperative, too: If it can control a chunk of customers beyond the desktop and take over IBM's direction-setting role, then it will succeed in a manner that makes today's Microsoft look like alemonade stand.

CI/InfoCorp's Aaron Goldberg can be reached at agoldberg@ziff.com.

Microsoft sees the day when it can set customers' perceptions in the world of Big Iron, too.

Aaron Goldberg, PC Week

INTERVIEW WITH DIGITAL'S HAROLD COPPERMAN
SOURCE: PC Week via First! by Individual, Inc.
DATE: August 23, 1995

On July 17, Digital Equipment Corp. appointed Harold Copperman as vice president and general manager of the company's Systems Business unit. Copperman, who has held down high-profile posts at Apple, Commodore Business Machines, JWP, and IBM, now faces one of his more challenging roles as the executive charged with turning DEC's Alpha strategy into a success. PC Week recently caught up with Copperman, who shared his thoughts on products, company strategy, and technology trends.

On Product and Company Strategy

PCWEEK: We believe Digital is going to be one of the companies that will be very important over time in a new way. Not just for the VAX sites but for whole new customers who are looking to downsize or upsize. But they have issues like should I go NT or Unix, or NetWare, or should it be Alpha or Power PC?

COPPERMAN: The road map is pretty clear, if you look at the Alpha, you can connect the dots yourself. We've got the four initiatives. If you are in the workstation space, technical computing, it makes a lot of sense. And Windows NT gives us the opportunity to transcend the Intel platform as well as leverage our relationship with Microsoft. It's just one more linchpin in an overall strategy.

PCWEEK: We are interested in the overall strategy. It's just that there needs to be more than a chip at the center of it.

COPPERMAN: But if you step back, there's nothing that mysterious about the company's overall strategy. We've been very crisp about the mission, which is enabling client/server solutions in a heterogeneous environment, working with partners and emphasizing our core strengths in networking, worldwide service and support.

We've been pretty crisp about our operating strategy. It's interesting: If you have one operating system like Apple, you're arrogant, but if you have three, you're confusing the customer. We have a rational choice. We have a place for VMS, there's a focus for Unix growth and in business, and there's a huge opportunity with Windows NT. Digital's the only pure player in all three operating systems today. It's non-confrontational. It's the same thing on the chip side. We have a two architecture strategy. We have an Intel strategy; and we have a strategy with RISC architecture.

PCWEEK: Sounds a lot like IBM.

COPPERMAN: But it's not like IBM. How many different architectures can you rattle off inside IBM? The high end, the AS/400, the RS/6000, Intel. How many different operating systems? MVS, VMS, DOS, OS/2, AIX.|

PCWEEK: More choice.

COPPERMAN: But it's a different kind of choice. Our choice is we are open. IBM's got its own chip, its own operating system. What we are trying to do is not trade market share with ourselves, but make the pie bigger. We have a strong alliance with Unix players and major database players, in addition to our alliance with Microsoft. We think with a three-tier client/server model of growing market share as opposed to swapping market share.

PCWEEK: What are the goals for the System Business Unit and for Digital?
COPPERMAN: We've had four consecutive quarters of financial improvement, three consecutive quarters of profitability; the company actually announced a profit for the first time in half a decade, we think that DEC is back. Now we've shifted our focus for fiscal 1996 to a strategic turnaround.

We are going through a major transformation. Last year was targeted as our financial turnaround, with objectives to stabilize revenue, improve margins, organize the company along independent lines of businesses. We took all of the major product groups and formed independent units, which was a big change for DEC, having been focused on central manufacturing. We formed five business product units: networks, storage, components and peripherals, PCs, and systems. Each business unit had its own engineering, design and manufacturing, marketing, distribution, sales, and service organizations. The idea was to go forward and build a market competitive model.

We also committed ourselves to a partner-centric model to get costs down and sales up, and focus on partners. All of the business units, save the Systems Business Unit, which is workstations and servers, went to almost 100 percent partner-focused model, and made money. The Systems Business Unit did not. We had significant improvement, but we were the cause of DEC losing money last year.

PCWEEK: Have you done all the cost-cutting and downsizing you need to do?

COPPERMAN: In this industry you're never done. I would tell you the bulk of the major cuts are done. The entire company is down to 61,000 employees. That is a 50 percent reduction from a long time ago, and a 25 percent reduction from 12 months ago when Bob Palmer said he was going to take cost out of the business. We've also had major reductions in our manufacturing facility, consolidated and reduced cost, and increased efficiencies. The major cuts are done and our business model is fairly close to our competitors. We also know we have to continue to take the cost out because gross margins are going to get squeezed, and get increases in productivity in our people.

PCWEEK: Why is that?

COPPERMAN: Because the costs were high, the gross margins had deteriorated, and the revenue was falling. Which is unfortunate because if you look at Digital, the systems business is the heart and soul of the company. It is where its reputation, its installed base is, where all the R&D is, so we had a lot of focus last year on basically stabilizing the revenue. We had growth from Alpha, growth from Unix, growth from Windows NT and we stabilized VMS.

Plans for Alpha and Beyond

PCWEEK: What was the growth in Alpha last year?

COPPERMAN: Thirty-seven percent year-to-year. The growth rate slowed a little bit. Part of that is because your base gets bigger. If you look at the Alpha business, we shipped over 127,000 systems total, there is over $5 billion worth of Alpha systems in the marketplace today. Which is better growth than we had with VAX the first few years. And we have probably about a three-and-a-half-year lead on competitors in terms of 64 bits. We had strong growth in Unix space, triple-digit growth in Windows NT space, and we are seeing a lot of VAX-to-Alpha migration. In addition, the application portfolio is up to 6,500 applications for Unix and roughly 1,200 applications on Windows NT.

PCWEEK: What plans do you have to increase Alpha sales of workstations and servers?

COPPERMAN: Obviously you have to have good products, which we do right now. In July we announced the last refresh our product line, and we have completely turned over our workstation product line: It is Alpha, PCI- based now. We've got a range of products that go from a low of $4,995-- we are the only 64-bit workstation under $5,000 today--all the way up to $50,000. We have the only one MIP (million instruction per second) workstation, so we've got the spectrum covered.

We have performance leadership at every point in the curve, from 50 to 300. The industry analysts are saying Alpha is the only RISC technology that can stay ahead of P6 and P7.

PCWEEK: What kind of tools do you have to bring applications over to Alpha?

COPPERMAN: We've put together an entire group of people that's entirely focused on the ISVs. We are working with the major ISVs first to make sure there's a critical mass of mainstream software that runs on the hardware. PCWEEK: You can say you have all those Unix applications. But when NT cranks up, that's where the battleground will be in a couple of years.

PCWEEK: It's easy to make a case for Alpha as a nice technical computing platform, as an enterprise system. It would be a little harder to make a case for it from the workgroup standpoint competing against Intel-based servers, Compaq, etc.

COPPERMAN: Yes, we have made the least ground there, but for very different reasons than you are thinking. I think it's been a focus issue. The installed base initiative has given us the most success given the size of our customer base in the East. The enterprise computing initiative is picking up a lot of steam now.

When I was at Apple we always said we had better technology, but that didn't mean anything until we could do something that no one else could do--desktop publishing. 64 bits for very large databases is a functionality no one else has right now. You can't talk to an SAP customer where performance isn't the second word out of their mouths. At the high end, that is the issue.

Technology Trends

PCWEEK: What's your take on the P7?

COPPERMAN: We are on the fifth `rev' of the Alpha chip, and we have a technology road map that will take use through the year 2,000. We think our current fab [fabrication plant] in Hudson [Mass.] that we've invested a half billion dollars in is capable of producing the next couple of revs of chips. We have price/performance curves that basically show where we think the Intel product line's going to be, and where we think the RISC product line's going to be, and then ours, which will be exponentially vertical.

PCWEEK: And then you have NT as the wedge?

COPPERMAN: In terms of volume. NT offers a lot of volume for the product. We are very comfortable maintaining the price/performance-- absolutely the performance leadership, and as you get the volume you certainly can take the price/performance leadership. So we think the hardware is in good shape. What we've been doing now is focusing on the software side. We are trying to work with the ISVs and make sure their software performs well on our platform.

PCWEEK: We expect in the corporate market that there will be a choice between Windows 95 or Windows 97, Cairo, whatever, but that NT will win a lot of those desktops over time.

COPPERMAN: If you look at this three-tier client/server model, at the high end, people are looking for mission critical support--very large databases, high transaction, security, backup, redundancy, and so on. That's MVS, VMS, and Unix. At the desktop they are looking for the shrink-wrap capability, graphical user interface--that's Windows. In the middle tier, which is the application server, that's a mix of Unix, Windows NT.

PCWEEK: But we think Windows NT is going to get into that desktop space, in the corporate market.

COPPERMAN: As Windows NT starts to look more like Windows 95, that will happen.

PCWEEK: What about Unix?

COPPERMAN: We are in excellent shape with Unix. We've shifted our focus, which has gone from how many [applications] do you have? Do you have enough critical mass to be viable? To now that they run on your box, do they run faster, tuned to the 64-bit architecture? Have you taken advantage of the fact that you can do things at 64 bits that you can't do at 32 in terms of functionality?

PCWEEK: Who are the major ISVs you have lined up?

COPPERMAN: The big ones are the database providers. Oracle, Informix, Sybase, Software AG, SAP. On the technical side, workstation side, we're doing the same thing. We are focusing on a core set of ISVs to make sure their software is ported and tuned, and then we're trying to provide benchmark information that's application centric.

The second thing we are doing is marketing. We've always had great products but we have not done a good job of telling people about them, so we have a very focused marketing strategy for 1996 that's targeting four strategic initiatives. One is focused on installed base--the migration of VAX to Alpha, upgrades, investment protection. Second is focused on the technical computing marketplace.

PCWEEK: And who do you see there?

COPPERMAN: We've targeted four or five application areas. For example, in the workstation space our products are very strong 2-D graphics. If you are going to play in 2-D graphics, there's about four or five market segments that make sense ECAD, MCAD, GIS, and others. If you are going to play in those markets, there are about 10 or 11 ISVs that own 80 or 90 percent of the market share. So we've worked with those ISVs to make sure their codes is ported.

PCWEEK: What about all the system integrators. Do you have a program for them as well.

COPPERMAN: Up until about a year ago we competed with the system integrators because we had our own system integration unit that was trying to be all things to all people. And we now have our SI business integrated with our accounts business unit, our large account teams. They are focused on a core set of skills: client/server computing, VAX- to-Alpha migration, SAP implementation. So now we are in the process of recruiting and working with the SIs as if they were our partners, building a relationship with Arthur Andersen, EDS, and so on.

On the other hand, nothing builds a partnership better than having a solution available that a customer wants. So the topic du jour is database mining, database warehouses. So you take packages like Oracle's database, our 64-bit technology, and you get performance improvements of up to 200 to 300 times.

PCWEEK: Over what?

COPPERMAN: Over existing [technology] today. Oracle has run benchmarks, and Larry Ellison indicated a 280 times improvement Oracle is going to run its business on Alpha products. They are buying Alpha TurboLasers to run their finance, marketing engines inside their company. When you talk about 200 to 300 times performance boost, you have to think about that. That says that things that used to run all night get done in minutes, and things that run in minutes, you get sub-second response time.

And we have customers now who run VMS at the host, Windows NT at the second tier, and Windows on the desktop. And the new alliance with Microsoft reinforces all of those points, reaffirms the viability of the company, puts the spotlight back on the hardware, and we have `favored nation status' in terms of software development.

PCWEEK: You have to think that the long-term goal of those customers is still to get off VMS.

COPPERMAN: VMS is a great operating system. I competed with it for 20 years [at IBM]. There's nothing on the market that is as robust, industrial strength. All of the major manufactures run on VMS; the semiconductor industry runs on VMS; these customers are very happy with what they've got. What they are concerned about is protecting their investment.... But all of our new applications business is in Unix and Windows NT.

The last piece of the equation is coverage. We have moved from a direct sales model. All the other product business units are selling through channels right now. The workstation and server business is the last organization there with a direct sales force. We have pared the sales force down now to the point where they are only focusing on the top 1,000 accounts worldwide, everything else goes through channel partners.

Biogr.

Harold D. Copperman

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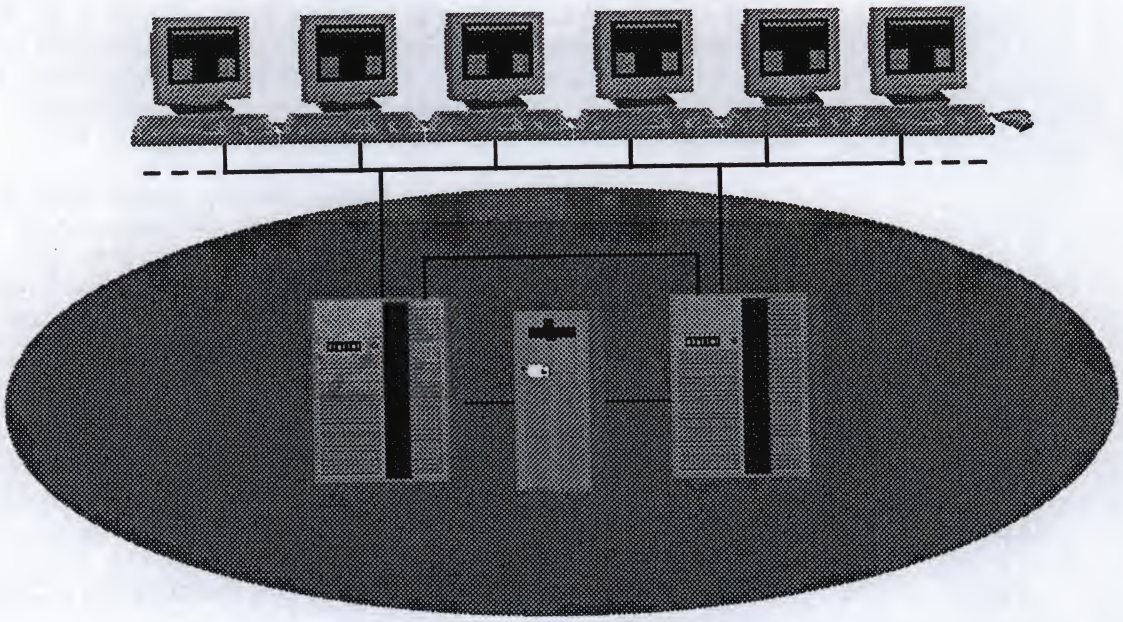
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Job History: Vice president and CEO of the Information Systems Group of JWP Inc.; president and chief operating officer of Commodore Business Machines Inc.; vice president and general manager of Eastern Operations for Apple Computer Inc. Copperman has also spent 20 years with IBM in different sales and marketing positions.

PC Week Staff, PC Week

digital

Digital Clusters for Windows NT



Technical White Paper

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Executive Summary

The explosive growth of Windows NT as an enterprise-level operating system has generated a demand for new high-availability tools and system management features. These tools, based on UNIX and other operating systems, are available in well established computing environments. Digital has begun to deliver advanced Windows NT solutions today.

Clustering technology is well understood by today's UNIX and OpenVMS system administrators. Multiple systems are grouped together to appear as a single system to users and to other processes. The advantages of clustering are:

- **High availability of system resources.** The workload of a failed system (failover) is assumed by its counterpart system to ensure continuous, uninterrupted services to end users and applications.
- **Improved scalability.** New resources can be added incrementally to the cluster which results in a cost-effective growth path to high performance.
- **Reduced system management costs.** Clustering makes it easier to manage multiple systems, reduces the costs associated with replicated data and allows specialized peripherals to be shared by more users.

Digital Clusters for Windows NT introduces the benefits of clustering technology to today's PC client/server LAN environments.

Introduction

Today, many customers are looking to Windows NT clusters as the next logical step in PC LAN evolution. Digital has responded to this need with Digital Clusters for Windows NT. Digital's goal in developing this product is to provide a low cost, high-availability solution for PC client/server LANs. Digital's open systems strategy, based on industry-standard hardware and software, and its strategic alliance with Microsoft, offer a solution which is ready now. The first version of Clusters for Windows NT focuses on minimizing the downtime caused by software, network, and system failures, and

- Offers a low-cost, high-availability solution for PC client/server LANs
- Is based on industry-standard hardware components and industry-standard software
- Supports Intel and Alpha architectures
- Supports failover of NTFS, Microsoft SQL Server and Oracle Workgroup Server
- Supports generic application failover for additional server based applications
- Allows clients to access the cluster as if it were a single system, through a common cluster name

What is Digital Clusters for Windows NT?

If one system fails, the second server in the cluster immediately assumes its workload.

Digital Clusters for Windows NT V1.0 is a general purpose, high availability solution for today's PC client/server LANs. It enables two Windows NT systems to be joined together, via a shared SCSI bus, to create a single system environment, or cluster. End-user clients have access to all the cluster resources, such as shared disks, file shares and database applications without having to know the names of the individual servers in the cluster. In the event that one system fails, the second server in the cluster will immediately assume its workload, reconnect clients and migrate shared storage and file shares.

Digital's Clusters for Windows NT software design is extensible, flexible and hardware independent. The first release of the product delivers critical, high availability features to Windows NT servers. Due to its extensible architecture, advanced clustering capabilities can be easily added over time, built on the same core product functionality. Software control of clustering gives users flexibility in integrating clustering with their existing application environments.

Enterprises have come to rely on high levels of availability from information systems. They are unwilling and unable to tolerate downtime as they re-engineer their businesses and expand their global operations. Performance statistics show that the best current option--Windows NT Server on a state-of-the-art SMP processor-- is still likely to have about 90 hours downtime per year. With the improvements that have been made to hardware, these failures are not the major reason for system downtime. Instead, software failures, software maintenance, and planned upgrades are currently the major source.

Clusters for Windows NT, with proper power management, supply engineering, and redundant communications--can reduce the average downtime to less than 12 hours per year, and in some cases, less than one hour per year. It can keep end users productive on business-critical applications and databases, and still allow for growth and flexibility.

Benefits of Digital Clusters for Windows NT

Clusters for Windows NT provides system-level high availability at very low cost using industry-standard, commodity components. A cluster is addressed by clients as if it were a single server. Similarly, the cluster configuration is managed as if it were a single server. Clustering provides high levels of availability through redundant CPUs, storage, and data paths.

High Availability

Clusters for Windows NT keeps end users productive on business-critical applications and databases, and still allows for growth.

High availability is made possible through failover capabilities. Simply stated, failover quickly redirects interrupted services and resources to clients using a backup path. Clusters for Windows NT uses a common cluster name which makes the functioning of the cluster invisible to the end user. The client does not need to know how the cluster is configured or how the workload is divided among servers. The benefit to users is that they can focus on tasks rather than technology.

Enterprises can leverage their application software investments because Clusters for Windows NT works with both packaged and in-house applications. Existing client applications can make use of the failover function without modification. Depending on the application, the user sees either a

message requesting a retry or the application continues uninterrupted. In-house applications can also take advantage of cluster failover capabilities by using the generic application failover feature.

Clusters allows users to partition workloads and use both servers. You have the benefit of greater capacity, and you maximize your investment in current resources.

The level of availability provided by Clusters for Windows NT compares well with fault tolerant systems. Clusters for Windows NT is more cost-effective because it does not require a complete mirrored backup of the primary system. Although the "hot standby" in fault tolerant systems provides non-stop availability, it does so at the cost of a backup system that does not add any computing capacity. Clusters for Windows NT, on the other hand, allows users to partition workloads and use both servers. You have the benefit of greater capacity, and you maximize your investment in current resources. It reduces your investment in new resources because it does not depend on custom hardware or proprietary interconnects.

Scalability

Clusters for Windows NT is a highly scaleable solution. You can add capacity to a cluster in several dimensions. I/O and storage can be added incrementally to efficiently and cost-effectively meet the dynamic needs of an enterprise.

The scalability of Clusters for Windows NT rests with the partitioned data model of its software architecture. This model delivers numerous benefits.

Scaleable solutions mean you can add capacity in several dimensions efficiently and cost-effectively. The mirrored backup in fault-tolerant systems undermines scalability.

- Because the workload is divided between the servers in the cluster and processed independently, better workload balancing is possible than with other types of solutions. With better load balancing comes improved system performance.
- Dividing the workload into smaller components provides greater flexibility. Clusters for Windows NT supports partitioning of the workload down to the disk level.
- Dividing the workload makes for more efficient failover. Unlike other failover strategies, small workload components can be failed over individually, rather than having to failover an entire server's workload. System resources that are unaffected by a failure avoid being migrated unnecessarily, improving both availability and performance.

The underlying design of Clusters for Windows NT enables scalability. In contrast, both the mirrored backup and the high degree of synchronization of fault-tolerant systems undermine scalability.

Industry Standards and Commodity Hardware

Clusters for Windows NT provides investment protection. Because it is designed for industry-standard hardware, software, interconnects, and protocols, it offers numerous advantages over other solutions. By supporting both Alpha and Intel architectures, enterprises are able to leverage their current hardware investments and feel secure in their ongoing choices.

Clusters for Windows NT supports a variety of off-the-shelf hardware components such as RAID subsystems, SCSI-2 disks and SCSI adapters. These off-the-shelf choices reduce cost, in the short term, and add to investment protection in the long term.

Similarly, supported clients for automatic failover include the most widely-used desktops running Windows NT, Windows for Workgroups or Windows '95. Other clients such as DOS, Mac and OS/2 can also be used with manual

reconnects. Another way Clusters for Windows NT provides investment protection is through support of industry-standard networking protocols between the clustered servers and clients. Digital Clusters for Windows NT supports all the Windows NT supported network protocols: TCP/IP, NetBeui, and IPX/SPX.

Clusters for Windows NT is fully compatible with Windows NT Server 3.51. Unlike other solutions, it is not a "port" of older technology to a new operating system; it was designed from the ground up for the Windows NT client/server environment. An SNMP agent is included enabling industry standard SNMP management tools, such as ServerWorks, to work with Digital Clusters for Windows NT.

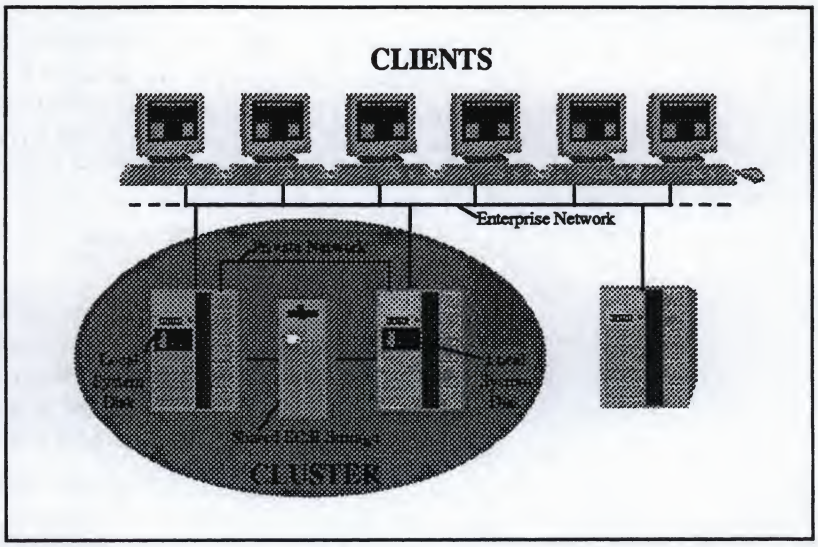
Why Clusters in a PC LAN Environment?

A cluster provides a single management environment. Clients view resources and services in the cluster as if they were local.

In a typical client/server LAN environment, a single-server system provides file, print, and application services to a group of desktop clients. In a cluster client/server configuration, the notion of a single server serving clients is extended to include multiple server systems. The collection of servers, called a cluster, is viewed by clients as a single server system. This is accomplished via cluster software, which performs the management, integration, and synchronization of the servers in the cluster, or cluster members. Work assigned to the cluster is partitioned across the two nodes with, for example, file services provided by one node, and database services by the other.

In a clustered environment, users (clients) have access to the combined resources of the entire cluster. Like the single server environment, a cluster provides a single management environment. Clients view resources and services in the cluster as if they were local. A major advantage of clustering in a LAN environment is the ability to add system components incrementally, to build in component redundancy for higher availability.

As customers deploy client/server solutions in their enterprise, they are concerned about system reliability and a cost-effective growth path for the future—attributes that are critical to supporting their user community and running their business. Digital's cluster technology on Windows NT is well suited to address these concerns by enhancing the availability, scalability, and management of data and key services within a client/server LAN environment.



Digital Clusters for Windows NT supports both Intel and Alpha Windows NT systems as cluster members. Any single cluster must have the same processor architecture: either Intel/Intel or Alpha/Alpha. The two cluster members do not need to be identically configured, and one or both may be SMP systems. Each clustered server must have its own local system disk that may be used to store data or run applications.

Non-Windows clients must know the names of the clustered servers, and must manually reconnect in the event of a failover.

Digital Clusters for Windows NT is a LAN server-based cluster solution. End-user clients are not members of the cluster. All Windows clients -- Windows NT, Windows 95, and Windows for Workgroups -- with LAN connections to the clustered servers are fully supported and can use the common cluster name to access the cluster. Other clients -- such as MAC, OS/2, or MS-DOS -- can access the cluster and benefit from the cluster resources. However, non-Windows clients must know the names of the clustered servers, and must manually reconnect in the event of a failover. Manual reconnection is also required for clients that have WAN connections (separated by a router) from the clustered servers.

End user clients access and manage Digital Clusters for Windows NT as a single system via the common cluster name. They don't need to know the individual names of the servers they are connecting to. The cluster name service software directs the clients to the correct disk or file share. The cluster configuration can be changed from any one of the servers in the cluster.

The two servers in the cluster are connected by up to three physical connections:

- Shared SCSI bus (or buses). All clustered data must reside on the disks or subsystem RAID storage connected to the shared SCSI bus. The number of shared SCSI buses that a cluster can support is limited only by the number of available slots in the Windows NT server systems that are cluster members. One or more shared SCSI buses are a required component of Digital Clusters for Windows NT.
- Enterprise network connection. This is the primary network that connects end user clients to the clustered NT servers. Any Windows NT supported LAN, such as Ethernet or FDDI, can be used.
- Private network connection. This secondary network connection,

between the two clustered servers, is highly recommended to eliminate a single point of communications failure in the cluster, and ensure that the two servers will be able to communicate with each other in the event of an outage of the enterprise LAN. The second network also allows manual failover of the cluster in the case of a network partition. Low cost Ethernet, such as thinwire or twisted pair, is more than sufficient to accommodate the minimal message passing traffic of the cluster software.

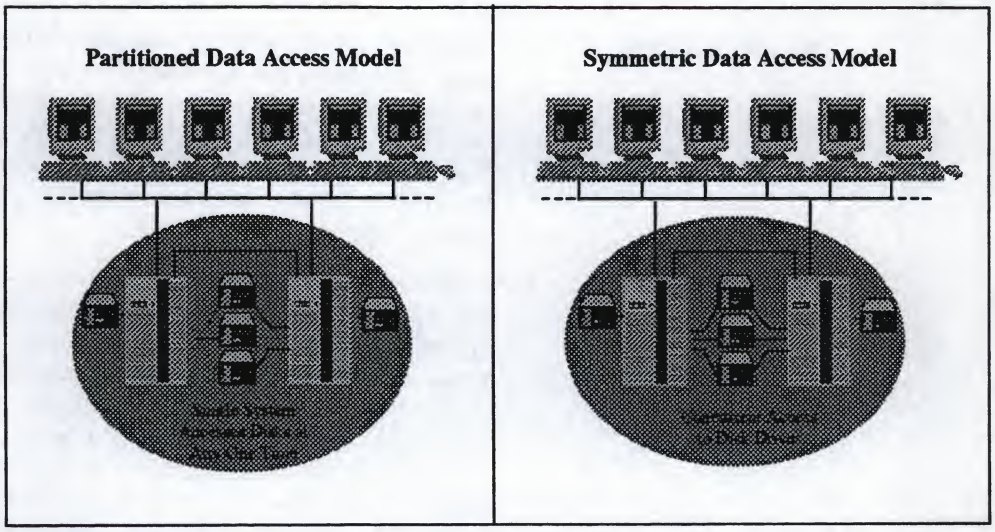
Digital Clusters for Windows NT allows partitioning of the workload to the disk level by assigning disks on the shared bus to one server at a time for management and control. Moving disk resources from one server to another is simply a matter of reconfiguration via the graphical cluster administration tool -- no need to power down or recable hardware components.

Digital Clusters for Windows NT supports the use of standard Windows NT management tools, such as the File Manager and net use commands, to manage cluster resources. The intuitive cluster administration tool allows easy configuration and re-configuration of the cluster. The cluster state and configuration are remotely accessible by any SNMP browser, through the standard SNMP agent and cluster MIB included with the cluster software.

Cluster data access models

There are two data access models that are used in clustering solutions: the partitioned data model and the symmetric data model. Digital Clusters for Windows NT is designed around the partitioned data model. Different workloads are distributed between the members of the cluster and operated on independently. Although the disks on the shared SCSI subsystem are connected to both cluster nodes at the same time, only *one* cluster member is allowed to access any one disk at any particular time. This partitioned workload distribution is culturally compatible with existing client/server PC LAN environments because PC LANs scale by repartitioning the workload and adding more servers and storage to the LAN.

The symmetric (or shared everything) data access model is used by VMSclusters. In this model, the same workload is distributed across multiple server systems, executing in parallel. Concurrent access to shared disks is managed by a distributed lock manager. While the symmetric data access model may have benefits for future versions of Digital Clusters for Windows NT, it is not supported in the current version.



The Nuts and Bolts about Failovers

What happens to the cluster during a failover

The specific events associated with failover, and total time for failover, depend on what type of failover is occurring. There are two types of failovers:

- Resource migration, or voluntary failovers, such as those generated by a management failover or intentional software shutdown of one of the cluster members
- Unplanned , or involuntary failovers, such as those occurring on power failure or other system error.

The following activities take place in the event of a failover:

- Detection time. In a planned resource migration, this take no more than a few seconds. The Failover Manager (FM) initiating the failover sends a message to the other cluster member about the failover, and the two FMs agree to put the disk(s) to be failed over offline. The following activities occur:
 - Any 'offline' failover scripts or DLL activity are executed
 - Shares, if any, are taken off line
 - File system caches are flushed to disk (every opportunity is taken in this case to assure that cached file system data is returned to disk prior to the failover)
 - File system is dismounted if possible
 - Disk itself is put offline

Detection for an involuntary failover begins when the two Failover Managers lose communication with each other. The default

Detection time for an involuntary failover begins when the two FMs lose communication with each other or realize too many errors are being logged against a disk. During normal cluster operation, a network connection with a 'keep-alive' protocol is established between the two Failover Managers. In the event that communications are lost between the servers, the initial failover detection time is amount of time that a FM will

setting is 30 seconds.

wait to re-establish network connection with the other FM, before assuming the other has failed and initiating a failover. Although this network communication timeout may be set as low as 1 second, the default setting is 30 seconds. Setting this time interval very low may risk false or premature failovers. SCSI failures are detected by accumulated I/O errors, either after users access the disk, or as a result of cluster software's periodic test of the disk.

- Stabilization period (involuntary failover only). This is an optional waiting period imposed by the cluster software in order to detect and prevent rapid failovers. The 'keep-alive' network protocol can be temporarily broken by a very busy server or transient network outage. In a cluster configuration with two networks, this period is required to perform network failover from one network to the other. In a single network configuration, this period helps ride through brief network problems and helps to improve stability and robustness of the cluster by decreasing false failures. The stabilization period is under system administrator control.

- SCSI bus arbitration period (involuntary failover only). After the network connection timeout above has expired, the FMs conclude that they cannot communicate over the network. In order to distinguish a system crash from a network partition, the FM initiating failover will clear the reservations on the disk by performing a bus reset. The FM then waits for a certain amount of time to see if the other FM will show interest in the disk by reasserting a reservation on the bus. This is to ensure that both cluster members never have control of the disk at the same time. This time interval is under system administrator control; the default setting is 30 seconds. Bus arbitration is only required in the event of lost network connectivity; otherwise, the FMs just communicate directly.

Disk failover time, when control is passed from one cluster member to the other, is under software control and is measurable in milliseconds.

- Disk failover, required for intentional migration and involuntary failover. The actual disk failover time, when control is passed from one cluster member to the other, is under software control and is very fast, measurable in milliseconds.

- File system integrity check. NTFS is a log-based file system. NTFS rolls its metalogs forward to ensure file system integrity as the file system is mounted on each partition of the disk. In the rare case when a volume cannot be mounted, the check disk program is executed. File system mounting typically is executed in 5 seconds or less.

Application recovery is dependent on the number and content of groups which must be failed over.

- Application recovery. The total amount of application recovery time is dependent on the number of groups and content of groups which must be failed over. The time to put any group on line depends on the number and type of failover objects contained in that group (see Failover Objects and Groups, next section). All 'online' failover script objects and database failover objects are executed after disks are put back on line. The time required for this recovery depends on the type or scripts or applications being failed over. For example, database applications may be required to roll back logs to recover the database, which may be lengthy in the case of a large database. The time to put a disk on line depends on the number of partitions and shares on the disk and may be considerably shorter than database recovery times.

When evaluating overall failover performance and timeout settings a tradeoff is made between fast failover times and cluster stability. The default

parameters of network communication timeout, stabilization period, and SCSI bus arbitration, are set conservatively so cluster software can make "wise" decisions about the need for failover. They can be set to shorter times to get a quicker failover, but the cluster resources may be subject to unnecessary migrations. For example, if a network connection timeout is lowered below a threshold where a busy server will have difficulty responding within the allotted time, then the cluster may be more subject to a spurious failover than if timeouts were left at higher settings.

Failover objects and groups

To flexibly define and manage failover objects, the system administrator creates logical groups of cluster services and resources which are called ***failover groups.***

Digital Clusters for Windows NT provides high availability for two types of **failover objects**: cluster services (for example, database applications), and cluster resources (for example, a network share). In the event of a failure in the primary server, cluster software will automatically provide the same resource to client end users using a backup path -- the secondary server -- to provide the resource or service. This transparent relocation of the failover object is called **failover.** This failover model is extensible in the sense that new failover objects may be added in the future, for example printers, TCP/IP addresses, or customer-defined objects.

To flexibly define and manage failover objects, the system administrator creates logical groups of cluster services and resources which are called **failover groups.** Resources in a failover group will move together; either they all are on line or they are all off line. Resources in different failover groups move independently. Resources in a failover group are ordered such that more primitive services are started first when going on-line, and the order is reversed when going offline.

Primitive services are restarted first when going back on-line.

Failover groups are easily defined by the graphical cluster administrator tool They tend to be a collection of storage devices and applications that are used together. For example, an SQLserver and the disks used to store the SQLserver database may be specified in the same failover group. A group also can be made up of one or more disks without an associated application as in the case of file service failover. If the Failover Manager detects a software or system failure, the whole failover group will be failed over to the alternate system.

Each failover group is associated with a failover policy that is defined by the system administrator using the cluster administrator tool. The ability to define failover policy for individual failover groups gives the system administrator more flexibility in workload balancing. Using the cluster administrator tool, the system administrator can define:

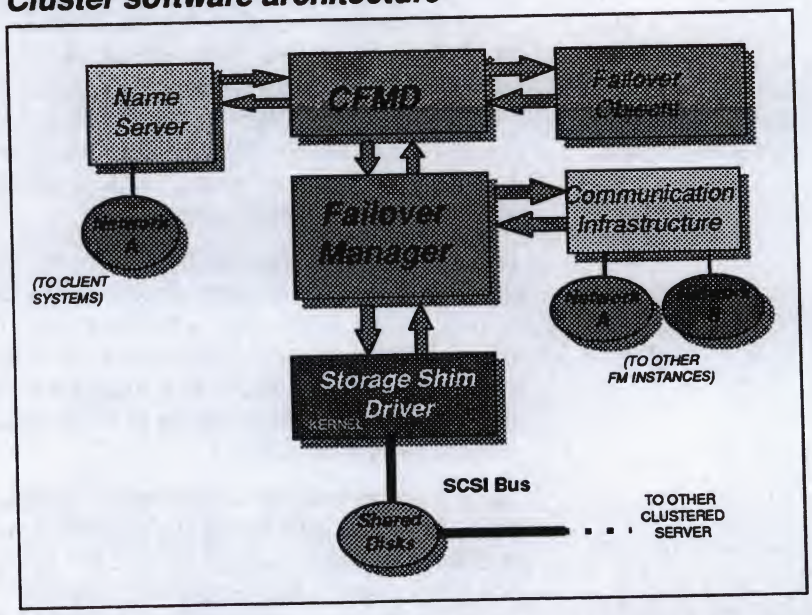
- Which cluster server will be the primary server for each group
- Disable and enable failover for individual failover groups. For example, the system administrator may decide to enable failover for mission critical applications only
- Whether the group will automatically migrate to the primary server when it returns to service in the cluster

The administrator may determine that the cluster workload must be rebalanced -- for example, a database application must be moved from one node to another because of changes in client service requirements. Rebalancing is easily accomplished through software reconfiguration of

failover group policy for the cluster. The administrator can override the failover group policy by:

- Manually migrating the group to the other server
- Disabling failover, forcing the group to stick on the current node. This could be used be to keep the group on the secondary while the primary was being brought up and down for maintenance and testing.
- Disabling the group, which would take the group offline temporarily while keeping its configuration known in the database.

Cluster software architecture



The Failover Manager ensures that access to shared resources is synchronized.

The "brains" of the cluster software is the Failover Manager (FM). The FM ensures that access to shared resources (such as disks on the shared SCSI bus(es)) is synchronized, identifies external or management events that may cause a failover, and executes appropriate failover policy for all failover groups. The Failover Managers running on both nodes in a cluster are synchronized through message passing communications.

The Storage Shim Driver, or SSD, is a small driver "wedged" in the SCSI I/O stack. It is a kernel mode component of Digital Clusters for Windows NT, and uses standard Windows NT APIs. The SSD is a software switch which controls access to the disks on the shared SCSI buses. Its main goal is to ensure that the two clustered servers never access a disk at the same time. If there is any uncertainty about ownership of a disk, both SSDs will put the disk off line rather than risk its integrity.

All information about the state of the cluster, including disk ownership, failover objects, groups, and policies, is stored in the Cluster Failover Manager Database (CFMD) which is layered on top of the Windows NT registry. The CFMD implements transactional semantics for its data access operations to guarantee that both nodes in the cluster will always have consistent and synchronized views of key cluster data.

Cluster Failover

The cluster FMs on each cluster node communicate over the network in order

Managers on each cluster node coordinate ownership of resources in the cluster.

to coordinate ownership of resources in the cluster. The secondary private Ethernet connection provides redundant communication in the cluster between FMs, to make sure the two cluster nodes can maintain communications. The enterprise network is used for cluster node communication where the private network has failed or no private network is installed. The secondary network is highly recommended to allow uninterrupted FM communication in the case of an overloaded or partitioned enterprise network.

The cluster Name Service supports a common cluster name, or alias, which can be used by clients to transparently reference cluster resources or services, regardless of which server is providing the requested resource to the client. There is a server and a client component to the Name Service. The client name service component must be installed on any client who wishes to take advantage of the common cluster name. The cluster name service is supported on all Windows clients: Windows NT V3.51, Windows 95, and Windows for Workgroups V3.1.1.

The client name service intercepts all client UNC (ie, \\name\share syntax) requests to the redirector. If the request is for a cluster alias, the client name service sends a request to the server name service to translate the cluster alias into the actual server UNC address. The server name service responds with the UNC of the cluster member exporting the requested cluster resource, and the client name service passes that UNC back to the client redirector. This address translation is done when the client connects to a cluster share or opens a file or named pipe to a cluster resource.

Supported failure modes

Digital Clusters for Windows NT can recognize and initiate failover in the event of system software, server, and SCSI controller failures. Failure of the Windows NT Server operating system will trigger a failover (initiated by the surviving cluster member), as will server failure caused by a system hang or power failure. The cluster software has the ability to monitor availability of supported applications, and in V1.0, SQL Server failures are reported directly to the FM and cause a failover of defined database application failover groups. Failure in the SCSI controller or cable to the disk subsystem will trigger a failover by accumulated disk I/O errors.

In the current version of Digital Clusters for Windows NT, partitions of the enterprise network connection do not automatically cause a failover. The cluster has no way of knowing whether a network failure was caused by failure of the network adapter close to the clustered server, or by a cable break between network clients away from the clustered server. If the system administrator recognizes a network problem that would be improved by failing over services from one cluster node to the other, the administrator can manually migrate cluster resources as long as the private cluster network connection is operational. If the private network connection is not installed, it is not possible to manually migrate cluster resources in the case of a network partition.

Failback

***Failback** describes what happens when the*

Failback describes what happens when the server causing the failover returns to an operational status again. If failback is enabled, the failover groups

failover groups automatically migrate back to the primary host.

automatically migrate back to the primary host in their original configuration. The cluster software assures that any stale data on the primary host regarding the disk and it file systems are cleaned up. If failback is not enabled, the failover groups remain on the secondary host. Failback is important to restore the cluster to full operation and restore the static load balancing of the cluster.

Applications supported for failover

Digital Clusters for Windows NT will provide failover capabilities for:

- NTFS file services and network shares (NetBeui, TCP/IP, and IPX/SPX)
- Microsoft SQL Server V6.5
- Oracle7 Workgroup Server V7.1, V7.2
- Any application that can be launched and shutdown in a script

Failover of client connections to cluster resources is supported, however, failover of open files is not. This restriction applies to client applications using named pipes for access to cluster resources as well. Named pipes are a networking transport used for communication. Clients talk to servers by addressing a particular named pipe name. The cluster name service provides a means for a cluster-wide named pipe name to refer to one server and then another.

Generic application failover is supported by allowing the system administrator to provide scripts that execute when a failover group comes on line, and when a failover group goes off line. The path name of the command line script file is provided via the cluster administrator. Generic application failover scripts are most commonly used to start and stop applications that are not directly supported by cluster software, like custom server applications that use data on a shared cluster disk. Another use of failover scripts is to send a notification message to the system administrator in the case of a failover event.

What happens to the application in event of a failover

Think of NT Clusters as the world's fastest field service!

No provision for preserving application context is made by any Windows NT high availability product -- including Digital Clusters for Windows NT. This is true for both database and NTFS file service failover. This is exactly the same situation as when a server fails and is brought back online today. Digital Clusters for Windows NT neither improves nor worsens the situation. The difference is that in a cluster the failed "server" is returned to service significantly faster that today's normal repair time. Think of clusters as the world's fastest field service!

Database application failover

A client application is connected to a cluster resource which fails over. "Well-behaved" client applications will close and reopen files.

Digital Clusters for Windows NT provides high availability to the database. If a client application is reading or writing data to a database on a disk (or system) that fails, the database is failed over to the backup server. Where the application resumes the operation is the responsibility of the application. For SQL and Oracle, any in-progress transaction will have to be rolled back and restarted -- one of the primary functions of database software is to provide the transactional semantics around database operations. This requirement is the same for all high availability products for Windows NT.

In cases where there is additional server side software -- for example, a custom in-house server application, the server software needs to be failed over by mechanisms similar to those used by the underlying database. The generic application failover capability addresses many of these server applications by allowing users to provide command line scripts for starting and stopping of server applications.

Client database application failover

The client applications connecting to a database that fails over will receive an I/O error or a connection lost error. It is the responsibility of the application to re-establish the connection (this requirement is the same for any Windows NT high availability product). If the client has established the connection to the cluster alias, then the client simply reconnects to the cluster alias and the cluster name service automatically routes requests to the secondary server.

Microsoft SQL 6.5 also provides failover APIs for applications connecting to a specific cluster server using DBLIB or ODBC. In this case, failover happens as above, but it is not controlled by the cluster software.

Other client application considerations

Open files

If a client application is connected to a cluster resource containing an open file or named pipe, which then fails over, any subsequent read or write operation will fail. It is up to the client application to handle this error appropriately. "Well-behaved" client applications will close and reopen the file or named pipe upon receipt of this I/O error. If the client application is connected to the cluster using the common cluster name, the subsequent reopening of the file or named pipe will establish a connection to the failover server without requiring the end user to manually reconnect.

No assumptions should be made about the amount of data transferred before failover. When a file or named pipe is open during failover, it is the client application's responsibility to maintain its own context and roll back to a safe point before continuing. Although the client file operation may need to be reissued, file system integrity is maintained.

Failover times

Windows clients using the cluster alias have minimal disruption to their work.

From the client's viewpoint, failover times can vary depending on the situation. Clients cannot connect to the cluster during a cluster failover. If a new connection is initiated during failover, the client will attempt to connect to the cluster for 15 seconds before returning an error to the client application. Once the failover is complete, subsequent attempts to connect will succeed.

However, clients with open files to the cluster are a different case. The first time the client attempts to access the open file during *or after* a cluster failover, the client will receive an error message from the redirector. The redirector will time out trying to access the open file with the translated UNC address of the cluster member that has failed over. It may take up to a minute for the client name service to discover and be redirected to the server providing the requested cluster service. Following the error message, the client must close and reopen the file or named pipe.

What does the end user see in the event of a failover?

Supported clients:

Clients which do not use the cluster alias must know the names of the two clustered servers and must manually reconnect to the secondary cluster server.

Windows clients accessing the cluster using the cluster alias will have minimal disruption to their work in the case of a failover. If the end user is accessing network file shares, or running a "well-behaved" client application accessing the cluster via named pipes or SMB, the end user may experience no disruption at all -- if the user does not access the cluster until the failover is complete. If the user accesses the cluster during the failover, they will receive an I/O or connection lost error message. All the end user must do is to simply click on "retry" to re-establish the connection to the cluster.

Other clients:

Other clients which cannot access the cluster via the cluster alias can still benefit from high availability provided by Digital Clusters for Windows NT. However, these end users must know the names of the two clustered servers. In the case of a failover, the end user client must manually reconnect to the secondary cluster server in order to continue access to the cluster service.

System Requirements

The minimum cluster configuration consists of:

- Two Windows NT server systems, each with its own system bus and system disk
- Two SCSI adapters providing external buses, one in each system
- One disk drive in a storage expansion box
- SCSI cables and terminators

Software

Each server must be running:

- Windows NT Server 3.51 operating system with Service Pack 4.

- Digital Clusters for Windows NT software

Optional server software:

- SQL Server 6.5
- Oracle Workgroup 7.1 or 7.2

Client software is included with the standard software kit and can be installed on any of the following client desktops to support cluster aliasing and other cluster features:

- Windows for Workgroups V3.11
- Windows NT V3.51
- Windows 95

Server Platforms

Clusters for Windows NT V1.0 supports the two most popular hardware architectures: Alpha and Intel. Both servers in the cluster must be of the same architecture, either Alpha or Intel. However, any models within each architecture can be combined in a cluster. For example, a Prioris HX server system could be used with a Prioris XL server system in a cluster. Table 1 below lists the supported servers.

Table 1. Supported Server Systems

Alpha Servers	Prioris Servers
AlphaServer 1000	Prioris ZX (Pentium)
AlphaServer 1000A	Prioris ZX (Pentium Pro)
AlphaServer 400	Prioris HX
AlphaServer 2000	Prioris XL
AlphaServer 2100	
AlphaServer 2100A	
AlphaServer 4100	

SCSI

Each server system must have a supported SCSI adapter installed on the system expansion bus, in addition to the internal bus adapter shipped with the system Refer to the Cluster Hardware Compatibility List, on Digital's World Wide Web site at www.windowsnt.digital.com, for detailed guidelines on supported SCSI subsystems.

Glossary

Adapter	An integrated circuit expansion board that communicates with and controls a device or system
Bus	A collection of wires in a cable or copper traces on a circuit board used to transmit data, status, and control signals. EISA, PCI and SCSI are examples of buses
Cluster	A computing environment created by connecting two servers via a shared SCSI bus for the purpose of ensuring system availability in the event of a failure. Storage devices such as disks or RAID subsystems connected to the SCSI bus are assigned to one or the other server in a cluster. To end user clients, a cluster appears as a single system.
Configuration Failover Manager Database (CFMD)	A database of registry updates for cluster information that keeps both servers in the cluster synchronized by using transactional semantics.
Device driver	A software module that provides an interface for communication between the operating system and system hardware, for example, a SCSI controller.
Failback	The automatic migration of failover groups to the primary host after the (primary) system causing an initial failover returns to operational status.
Failover	In a cluster system failure, the relocation of cluster services (such as applications) or cluster resources (such as a cluster share) to end user clients using back up paths.
Failover group	A logical group of failover objects. The groups are typically made up of storage devices and applications. For example, SQLserver (the application) and the disks used to store the SQLserver database would be a logical failover group. A group can be also made up of one or more disks without an associated application.
Failover object	Any cluster service or resource for which you want to ensure availability in the event of a system failure. Failover objects can be disks, database applications on the servers, or file shares.

Failover Manager	The software on each cluster server which draws information from, and manages, failover objects. It is responsible for keeping track of events (such as a SCSI adapter or system failure) and determining if a failover should occur. It then determines what object or failover groups need to be failed over.
Fault tolerance	A method of ensuring the availability of a computing environment by using a back up system that mirrors the primary system. The back up system is typically called a "hot standby". The backup system does not provide any additional computing capacity; it is only available for use in the event of a failure of the primary system. For this reason, it is a costly method of ensuring availability.
Idle standby	A system that provides dormant backup to the primary server in a cluster. It's job is to wait for the other server to fail.
Load balancing	The ability to partition the workload by assigning resources (disks, databases etc.) to servers in the cluster and defining failover/failback policies. This provides an efficient and effective use of server resources.
Name Server	Software installed on the cluster servers that works with the client software to create the illusion of a single system through aliases. Using aliases, the client is unaware of the name of each server or how the cluster workload is distributed.
NTFS	NT File System. The standard file system for Windows NT operating system.
RAID	Redundant Array of Independent Disks. A collection of storage devices configured to provide higher data transfer rates and/or data recovery.
Redundancy	A method of protecting against failures by building in extra, back up components to a system.
Scaleable	In a system, the ability to add additional capacity as needs require.
SCSI	Small Computer System Interface. An intelligent bus for transmitting data and commands between a variety of devices.
SCSI-2	The second generation of SCSI; includes many improvements to SCSI-1, including fast, wide SCSI.

SCSI-3	The third generation of SCSI; introduces improvements to the parallel bus and high-speed bus architectures
Storage Shim Driver	Cluster software that works with the operating system and the drivers in the I/O stack. It acts as a switch that mediates access to disks and ensures that user data is not corrupted.
Symmetric multiprocessing (SMP)	A method of adding computing capacity to a system by adding processors.
UNC	Universal naming convention for LANMAN protocol. This is the traditional \\server\share syntax.

DIGITAL CLUSTERS FOR WINDOWS NT
Questions & Answers

GENERAL DESCRIPTION

The vision for Digital's Windows NT clusters is to provide a single-system environment that transcends multiple Windows NT server systems. This "cluster" of NT servers provides a common, highly-available set of services to PC and workstation clients. The NT cluster is addressed and managed as a single, secure entity, and enables the easy addition of incremental processing, I/O, and storage capacity into the cluster domain.
For Windows NT customers, this translates to reliable access to system resources and data and investment protection of both hardware and software.

- Provides high availability and scalability to client/server LANs.
- Designed specifically for client/server and the Windows NT operating system; this is a new technology, not a port of existing cluster technology. It is a layered product on top of the Windows NT operating system.
- Open--Uses industry-standard components; runs on Intel and/or Alpha platforms and will have multiple client types.
- Benefits to all applications, out-of-the-box with no modifications required;

DIGITAL CLUSTERS FOR WINDOWS NT
GENERAL QUESTIONS

1. I'm just a PC user. I've heard the term "cluster," but I don't really know what it means. Can you tell me what a cluster is, and how can it help me solve my business problems?

 A: Digital defined cluster technology 10 years ago and has maintained the highest quality in terms of defining this technology. Digital defines a cluster as a group of systems that is addressed and managed as a single system and provides high levels of availability through redundant CPUs, storage, and data paths. Clusters are also highly scalable, meaning that you can add CPU, I/O, and storage incrementally to grow capacity efficiently as your business grows. In the definition of Clusters for Windows NT, Digital has extended this definition to providing very high levels of availability using low-cost, industry-sandard components.

 The benefit to your business is that you can be more productive because of almost no downtime or loss of data, etc. Your MIS dpartment can upgrade its computing resources incrementally and blance workloads across these resources in an efficient way.

2. I heard that this product won a big award.

 A: Yes, Digital's Clusters for Windows NT won the "Best of COMDEX" award in Fall COMDEX '94 in Las Vegas, sponsored by Byte Magazine. The award category was "Most Significant Technology", given to the technology or product viewed as having the most impact on the industry in the coming years.

3. How does Windows NT Clusters integrate with the Windows NT Operating System?

 A: Digital's Clusters for Windows NT V1.0 product is tightly-integrated with the Windows NT operating system. Clusters is architecturally compatible with Windows NT, using standard, extensible Windows NT interfaces and mechanisms. You can build a cluster using existing NT hardware and software.

 From a user interface perspective, the cluster is accessed exactly like a single server. For example, with file services, remote directories are accessed by clients of the cluster through the File Manager utility, the same way you normally access any directory in Windows or Windows NT. The actual location (which server) the directory is on is transparent to the end user. Also, these directories can be accessed without having to know where they reside in the cluster.

4. What important ISVs are you working with?

 A: We are actively engaged in discussions with many premier server application vendors about our clustering technology for Windows NT. Such partnerships are a key part of our strategy to enable highly-available and scalable applications on Windows NT. Obviously, reference to specific vendors we are talking to is confidential at this time.

5. Are any other hardware OEMs interested in licensing your technology?

 A: We are actively engaged in discussions with many premier server vendors about our clustering technology for Windows NT. Obviously, reference to specific vendors we are talking to is confidential at this time.

6. What will it cost?

 A: Pricing discussions are premature at this time. However, we intend to price competitively for the value cluster technology brings to the NT market.

7. What degree of availability does Windows NT Clusters offer beyond that offered by RAID?

 A: RAID is a DISK availability solution, and the RAID controller or host (with host-based RAID) represents a single point of failure. Clusters is a SYSTEM availability solution. It supports redundancy in multiple system components, including subsystems such as RAID controllers. Clusters is complementary to RAID by adding system level availability.

8. What degree of availability and scalability does Windows NT Clusters offer beyond that of SMP?

 A: SMP is not a high availability solution. SMP is a PROCESSOR scalability solution, characterized by tightly coupled processors and shared memory. With clusters, you can scale total server system capacity, including CPU, storage, I/O, and software.

 Clusters offers high availability through component redundancy, so when a component or server fails, the cluster can continue to provide service. You can also cluster SMP servers.

9. How does the availability of Windows NT Clusters compare to Fault Tolerance?

 A: Fault Tolerant systems, while providing extremely high levels of availability, typically employ passive standby components that remain idle until a failure occurs. This approach is very expensive, especially considering that the duplicate components go virtually unused. It is also typically achieved with proprietary or non-commodity components. In general, 2 systems delivering fault tolerance provide less than 1 system worth of capacity.

 In a a cluster, high availability is achieved using active backup subsystems. These backup subsystems perform normal, routine functions, and are themselves primary servers for a given set of cluster resources. The cluster approach enables you to get the most out of your computing resource investments and still achieve high levels of availability. Clusters scale well, in that a 2-node cluster typically delivers close to 2 systems worth of capacity.

10. How does Windows NT Clusters stack up relative to other NT cluster products?

 A: Digital's Clusters for Windows NT will offer the most complete, most scalable, best integrated, and best supported implementation for Windows NT. Unlike other projects, Digital has designed the clusters software from the ground up and specifically for Windows NT; it is not just a port of an existing cluster technology.

11. How does Windows NT Clusters stack up to the UNIX Clusters products currently on the market:

 A: The various UNIX Cluster offerings are dramatically different from each other. Typically customers should evaluate UNIX vs. NT based on their application requirements. Clustering capabilities is one facet of that analysis.

12. Will this be an Alpha-only product?

A: No. Digital's Clusters for Windows NT supports multiple NT servers--either Intel or RISC and multiple client types.

On the client side, the goal is that you can use essentially any client you have today. We expect to support Windows for Workgroups 3.11, Windows 95 and Windows NT in V1.0. We will be evaluating additional client access as the business case warrants inclusion of additional clients.

13. When can I have someone present this new technology to my organization?

A: Check with your sales representative in your area to set this up in your organization.

DIGITAL CLUSTERS FOR WINDOWS NT *AND MICROSOFT*

14. Microsoft recently licensed Digital's NT Clusters technology. What does this mean?

A: Digital is licensing its Windows NT base cluster technology to Microsoft. Customers require reliability, scalability and performance. Digital is the leader in this technology and this base technology incorporated into Windows NT will dramatically expand the market opportunity for both companies. Digital will also continue to enhance its offerings with features that customers want.

15. Why is Digital licensing its technology for Windows NT clusters to Microsoft?

A: Digital feels that licensing its clusters technology to Microsoft will cause rapid market formation. Digital is eminently positioned to satisfy the increased demand this will create for the industry's most scaleable range of hardware platforms. Further, Digital has the most experience providing tools, services, and support to customers deploying business critical systems on Windows NT.

16. Digital has made quite a bit of noise about clusters, on both OpenVMS and UNIX, providing high levels of availability and scalability. Is the technology it is licensing to Microsoft the same as is used in either its OpenVMS or UNIX clusters?

A: Digital's Clusters for Windows NT brings many valuable attributes of VAXclusters to the Windows NT platform in a manner that is best suited to the applications and client/server computing style of the platform. It is new technology designed explicitly for Windows NT that brings distributed availability and manageability to the PC LAN space.

17. How do both companies see bringing clusters capabilities to market?

A: Digital will bring clusters to market as a layered product. Microsoft intends to incorporate this technology in future versions of Windows NT Server.

18. When will Windows NT clusters be available?

A: Digital will have a first version of Windows NT clusters in field test this winter. Microsoft will be incorporating clusters into future versions of Windows NT Server. Microsoft will announce delivery dates later.

19. Will Digital's initial version of clusters support all Windows NT platforms?

A: The initial version will support the Intel and Alpha platforms. Other platforms will be evaluated on the merits of the individual business case for supporting each. Microsoft will deliver hardware-neutral support in its product.

20. Will Digital and Microsoft jointly market clusters capabilities?

A: Digital will initially sell its own version of clusters while collaborating on the transfer of technology to Microsoft. We are currently discussing the possibility of joint marketing activities

When Microsoft brings its own version of clusters to market based on this technology, Digital will migrate existing customers to the new base version and cease selling its own layered product. Digital will offer layered tools and services that work across versions of clusters.

21. How will Microsoft and Digital ensure compatibility across versions?

A: In the spirit of good business practice Digital and Microsoft will continue close technical collaboration to ensure compatibility.

22. Should ISVs working with Digital on building cluster-aware applications wait?

A: No. Close technical collaboration between Digital and Microsoft, plus Digital's commitment to migrate existing customers, means that developers working with Digital now on building cluster-aware applications can be confident that their designs will be compatible with future Microsoft systems.

23. What are your plans for NT Clusters beyond V1.0?

A: Given the positive outcome of this joint relationship we are actively looking at ways to enhance Windows NT to be better positioned as an enterprise solution.

Digital/Microsoft Clustering Questions and Answers Regarding the de-facto standard 'Wolfpack'

Q) What is Digital's strategic clustering offering?

A) Digital will adopt "Wolfpack" (code name for Windows NT Server clustering) as the standard clustering solution. As an added customer benefit, Digital will offer an enhancement package layered on Wolfpack that provides additional enterprise functionality which may include scalability enhancements, disaster tolerance, and administrative tools.

Q) Is the "Wolfpack" product based on the Digital clustering product?

A) Digital and Microsoft share a common vision of clustering in the client/server marketplace. In fact, Microsoft did license Digital's clustering tech. in August, 1995. Although Microsoft ultimately did not use specific lines of Digital code, Digital has acted as a core partner in the design of Wolfpack by participating in numerous discussions with the Microsoft dev. team as well as in the Wolfpack open design process.

Q) Is Digital the main Microsoft clustering partner?

A) Microsoft: Digital is one of our primary partners as publicly announced last fall in our October 12th press release. Microsoft and Digital continue to work closely together.

Q) Is Digital the only company whose technology is being incorporated into Wolfpack?

A) No, Digital is working as a leading contributor providing its expertise to the Wolfpack initiative. It should be noted that there is no Digital source code in the release of Wolfpack currently under development. Other partners contributing their expertise to Wolfpack include Compaq, HP, NCR, and Tandem.

Q) How does Microsoft's recently announced agreement with Tandem affect Digital's relationship with Microsoft?

A: Digital continues to support the Open Process that Microsoft is pursuing with its Wolfpack partners. Incorporation of expertise from other industry partners in Wolfpack makes it a stronger solution for all Windows NT Server customers, including Digital's. The recent agreement with Tandem does not affect the already strong Alliance for Enterprise Computing between Digital and Microsoft.

Q) Digital is shipping their product - what does Microsoft think of that product?

A) Microsoft: We are delighted that Digital is providing high-availability solutions on Windows NT Server to our common customers. You should contact Digital for more details.

Q) Is Digital supporting the Wolfpack APIs?

A) Digital is an active participant in the Wolfpack API design reviews, and enthusiastically supports both the process and the APIs. As it is appropriate, Digital will adopt the Wolfpack APIs for its clusters product. However, because there was no standard cluster API available during the early development and design stages of its product, Digital has chosen not to expose APIs in its initial product, but Digital will expose Wolfpack APIs in subsequent versions of its product.

Q) If Wolfpack is Digital's strategic clustering API, and since it's not available today, how will ISV's support Digital Clusters for Windows NT Server at this time?

A) Applications can take advantage of failover and failback in version 1 of Digital Clusters for Windows NT Server via its generic application failover scripting capability.

Q) Will there be a migration plan for customers who have licensed the Digital Clusters for Windows NT package with plans to use Wolfpack in the future?

A) Digital and Microsoft are working together to assure a smooth migration path for customers from Digital Clusters for Windows NT to Microsoft's future cluster software.

Q) How will customers of Digital Clusters for Windows NT Server migrate to Microsoft's Wolfpack product?

A) Those customers wishing to migrate will do so easily through a wizard-like installation routine from Digital which will remove the Digital clusters product and install the Wolfpack product. Since the Wolfpack product is not yet entirely defined, the details of this are subject to change.

Q) Is Digital shipping Microsoft's product?

A) No, the Microsoft clustering product is not available at this time; however, Digital will offer Wolfpack as the standard clustering solution as soon as it is available from Microsoft.

Q) Which version of Microsoft SQL Server will support the database failover capability provided by Digital Clusters for Windows NT Server?

A) Microsoft SQL Server 6.5.

Q) Which servers from Digital will support SQL Server 6.5 failover with Digital Clusters for Windows NT Server, and when?

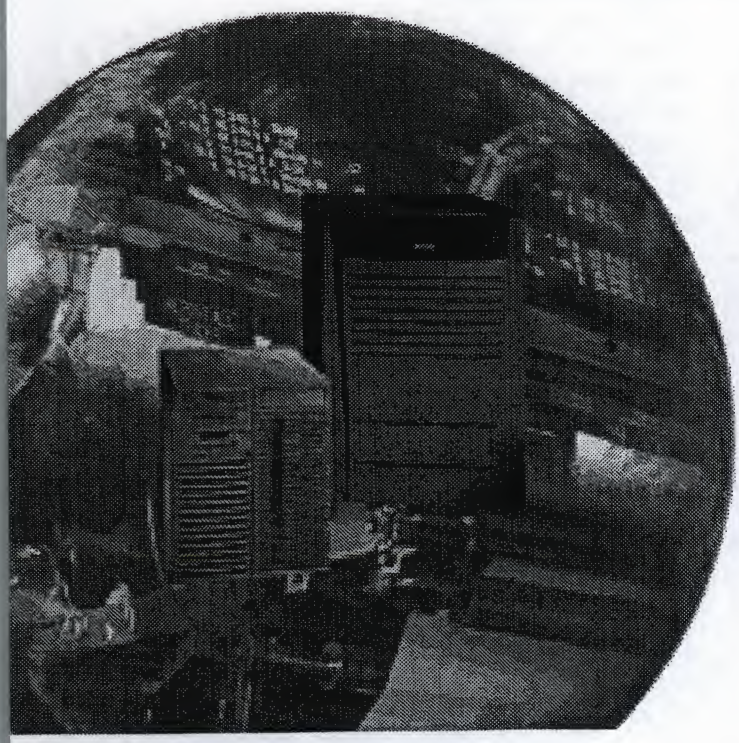
A) Digital's AlphaServers and Prioris servers will both support this capability. Contact Digital for specific model numbers and availability.

digital™

Digital Clusters for Windows NT

Maximum uptime all the time — for your most critical applications

System crashes, power failures . . . events like these can jeopardize server availability and your users' ability to get work done. Especially in the real world of enterprise-wide computing where work loads are growing exponentially, and high-availability operating system services are critical. Digital Clusters for Windows NT™ heralds a new way of thinking about client/server LANs through its approach to clustering of servers. In short, Digital's cluster technology brings the benefits of affordable, high-availability computing to client/server workloads and usage models.



What if you could eliminate the costly downtime that occurs with power failures, system crashes, bad cables, and all the other things that can go wrong with your server? Now you can.

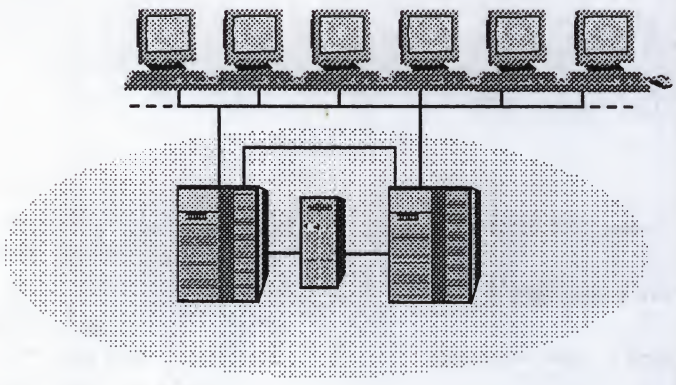
Digital Clusters for Windows NT allows a pair of PC LAN servers to be linked together so that they act like a single system. But they don't fail like a single system would.

How? Redundancy is built in. That means if one server goes down, the other takes on the work load. So your applications are highly available and your data is always accessible. Your end users are happy and productive, and you can manage your LAN proactively.

Benefits

- User data is always available, minimizing downtime
- Maximizes productivity since both servers carry full work loads — all the time — with no idle standby
- Ensures investment protection for existing client applications, which fail over without modification thanks to NTFS failover
- Simplifies cluster management for the system administrator since he or she uses a Windows®-based configuration manager
- Eliminates the need for end-user training since cluster aliasing enables them to access the cluster as a single system

uptime all the time



System-level, high-availability — the server solution that won't let you down
Digital Clusters for Windows NT is simply a pair of Windows NT servers that are accessed by clients as a single system. System-level high-availability is assured through two servers, shared storage, a second Ethernet or FDDI interconnect to ensure cost-effective communication, and redundant data paths. This means even in the event of failures, your system services remain operational.

Because Digital's server platforms are highly scalable, you can add CPU, I/O, and storage incrementally to grow capacity efficiently as your business expands. In addition, Digital Clusters for Windows NT provides very high levels of availability using low-cost, industry-standard hardware and software components.

If increased subsystem availability is a goal, Digital Clusters for Windows NT supports external RAID subsystems.

For businesses, this means increased productivity as a result of significantly reduced downtime. Plus, MIS departments can upgrade their computing resources incrementally and balance work loads across these resources in an efficient way.

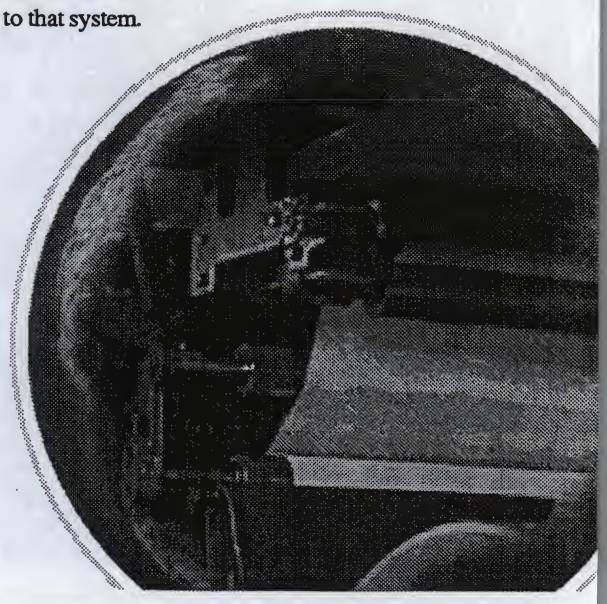
From a user's perspective, the cluster is accessed exactly like a single server. For example, with file services, remote directories are accessed by clients through the File Manager utility, the same way you normally access any directory from Windows 95 or Windows NT. The actual location of the directory is transparent to the end user.

At the heart of Digital Clusters for Windows NT is the Failover Manager, which monitors events — such as a server or SCSI bus failure — that would call for a failover. The Failover Manager initiates the failover and determines which services and clients are automatically redirected to the second server.

Digital Clusters for Windows NT lets you balance the work load across the cluster. Files and databases are assigned to one server, but can be failed over to the second server in the event of a system failure. With Digital's approach, only those resources or services that are affected by a particular failure are relocated. You also have the ability to create "failover groups," which are collections of services that should fail over together. For example, SQL Server™ and ORACLE® Workgroup database and associated file shares. If the primary server comes back online, the cluster gives the option to initiate failback. The software will then restore services to that system.

Field service feature — on call 24 hours a day
Digital clustering software allows the initiation of manual failover so preventive maintenance or system upgrades can be performed without disrupting the user community. It's like having a field service organization available 24 hours a day!

Designed specifically for the Windows NT environment
With Digital Clusters for Window NT, you get continuous availability for your most critical client/server applications — without a forklift overhaul of your existing Windows NT environment. That's because Digital Clusters for Windows NT is designed from the ground up to be consistent with client/server work loads and usage models.



Digital Clusters for Windows NT V1.0
Supported Hardware List

This document is a compilation of the systems and options tested and supported by Digital Clusters for Windows NT V1.0. Refer to the Digital Clusters for Windows NT V1.0 Configuration and Installation Guide for complete information on configuring your cluster.

Before using any of the hardware listed in the following pages, consult the documentation for your system to be sure your selected options are also supported on that system. Both the clusters software and your system must support the hardware in your clusters configurations.

If you are configuring Clusters with RAID 310 or RAID 410, ensure you have access to updated HSZ driver and RAID firmware. Contact carr@ljsrv1.enet.dec.com for information.

Supported AlphaServer Systems

System	I/O Bus	Min ECU	Min ARC Firmware
AlphaServer 2100 4/xxx AlphaServer 2000 4/xxx	EISA/PCI	V1.81	V4.36
AlphaServer 2100 5/xxx AlphaServer 2000 5/xxx	EISA/PCI	V1.81	V4.34
AlphaServer 2100A	EISA/PCI	V1.81	V4.4
AlphaServer 1000	EISA/PCI	V1.8	V4.25
AlphaServer 1000A	EISA/PCI	V1.8	V4.46
AlphaServer 400	ISA/PCI	V1.8	V5.5
AlphaServer 4100	EISA/PCI	V1.9	V4.44.0

Supported Prioris Server Systems

System	I/O Bus	SCU	System BIOS
Prioris HX Server	EISA/PCI	V1.02 upgrade	V1.09
Prioris XL Server	EISA/PCI	V1.00 V1.02 V1.03 V1.05 V1.08	V1.00 V1.02 V1.04 V2.01 V2.04
Prioris ZX Server	EISA/PCI	V3.30	V1.00.07.BGO

Cluster-Ready Kits for Prioris Servers

Digital Part Number	Description
FR-BA356-NT	Kit includes one BA356 storage enclosure, (2) 2944W adapters, DWZZB-VW signal converter, tri-link connector, SCSI cables, Y-cables, 2 network cards, terminators and QB-53V9A-SA Digital Clusters for NT software kit.
FR-BA356-N2	Expansion kit includes one BA356 storage enclosure and DWZZB-VW signal converters, Y cables, tri-link connectors. Pre-requisite is FR-BA356-N2.

Supported SCSI Adapters

Each server system must have a supported SCSI adapter installed on the system expansion bus, in addition to any internal bus adapter shipped with the system. Digital strongly recommends that you disable or remove all internal termination and use Y cables or tri-link connectors to implement external termination.

Adapter	Description	Connector	Driver	Notes
Digital KZPSA-BB	**PCI-based Fast Wide Differential SCSI-2 controller**	**68 pin differential**	**NT driver V1.3 required deckzpsx.sys**	**FW A10 required Supports AlphaServers only**
Adaptec AHA-2944W	**PCI-based, fast wide differential SCSI-2 controller.**	**68 pin differential**	**aic78xx.sys V1.23s Supplied with Digital Clusters for WNT software**	**1. Supports Prioris servers 2. Supported on all AlphaServer systems except the 4100. 3. Bus adapter requires a jumper when used in a multihost configuration. If you are using the adapter's internal termination, install the jumper at the J5 jumper block. 4. BIOS versions 1.2x for the Adaptec AHA-2944W are *not* compatible with Digital Clusters for Windows NT because these versions of the BIOS provide no way of disabling bus reset. 5. BIOS 1.12 - 1.16 supported 6. Not compatible with the HSZ40RAID controller on AlphaServers.**

Supported Storage Enclosures

The following disk storage expansion enclosures are supported.

Storage Enclosure	Description	Transmission Method	Data Path Size	Connector
BA346-KB	Pedestal, 16 bit SCSI	Single-ended	Wide	68 pin
BA350-KB	Pedestal, 8 bit SCSI	Single-ended	Narrow	50 pin high density
BA356-KC	Expansion unit, 16 bit SCSI	Single-ended	Wide	68 pin

Note: Single-ended storage enclosures require a SCSI signal converter to connect to the supported adapters.

SCSI Bus Extenders and Signal Converters

Signal converters convert single-ended SCSI signals to differential SCSI signals. They are used to connect single-ended and differential bus segments to allow communication between devices with different transmission methods or to overcome cabling length restrictions on single-ended buses. Some signal converters also can be used to connect narrow single-ended devices to a wide differential bus. You can have a maximum of two signal converters installed between devices.

The following signal converters are supported.

Signal Converter	Minimum Hardware	Minimum Firmware	Data Path	Description
DWZZB-AA	E01	A02	wide/ wide	Standalone product - Includes built-in universal power supply for general purpose SCSI bus length and signal conversion needs.
DWZZB-VW	E01	A02	wide/ wide	StorageWorks building block. Installs in disk slot 0 in a BA356 or BA346 storage enclosure.
DWZZA-AA	E02	n/a	narrow/ wide	Includes DWZZA-MA (module for embedding in SCSI systems) and a power supply encased in small standalone unit. For use with BA350-KA.
DWZZA-VA	F02	n/a	narrow/ wide	StorageWorks building block. Installs in disk slot 0 in a BA350-KA storage enclosure.

Supported RAID Controllers and Subsystems

StorageWorks HSZ40 RAID Controller Module

May be combined with various storage enclosures to create versatile RAID subsystems. Refer to the Digital Systems and Options Catalog, or StorageWorks business unit, for detailed configuration options and part numbers.

Controller	Description	Connector	Firmware	Notes
HSZ40-BA HSZ40-Cx	RAID Array controller	68 pin differential	V3.0	6-channel, various cache options Requires V2.4 driver for HSZ

StorageWorks RAID 410 Sample Configuration and options

The following table represents one option for configuring a StorageWorks RAID Array 410 subsystem. Refer to the Digital Systems and Options Catalog, or StorageWorks business unit, for detailed configuration options and part numbers.

	Description	Connector	Firmware	Notes
SWXRA-Y*	RAID Array 410 subsystem	68 pin differential	V3.0	
SWXD3-**	Disk drive in Storage Works Building Block.			Quantity depends on the amount of storage required
SWIKT-CA	WNT/Intel RAID Array 410 platform kit. Includes PCI/SCSI adapter.			For Intel systems with PCI
SWDKT-CA	WNT/Alpha RAID Array 410 platform kit. Includes PCI/SCSI adapter.			For Alpha systems

StorageWorks RAID 310 Sample Configuration and options (1)

The following table represents one option for configuring a StorageWorks RAID Array 310 subsystem. Refer to the Digital Systems and Options Catalog, or StorageWorks business unit, for detailed configuration options and part numbers.

Digital Part Number	Description	Connector	Firmware	Notes
SWXRA-Z1	RAID Array 310 subsystem	68 pin differential	V3.0	Dual power supplies
SWXRA-Z2	7-slot SBB expansion cab.	68 pin		Doubles storage capacity of 310
SWIKT-DA	WNT/Intel RAID Array 310 platform kit. Includes PCI/SCSI adapter.			For Intel systems with PCI
SWDKT-DA	WNT/Alpha RAID Array 310 platform kit. Includes PCI/SCSI adapter.			For Alpha systems

Supported Disks

Disk Device	Description	Data Path	Minimum Firmware
RZ26L-VA	1.5GB disk in SBB	Narrow	440C
RZ28B-VA	2.1GB disk in SBB	Narrow	0006
RZ28C-VA	2.1GB disk in SBB	Narrow	0004
RZ28D-VA	2.1GB disk in SBB	Narrow	0008
RZ29B-VA	4.3GB disk in SBB	Narrow	0014
RZ26L-VW	1.5GB wide disk in SBB	Wide	442E
RZ28C-VW	2.1GB wide disk in SBB	Wide	0004
RZ28D-VW	2.1GB wide disk in SBB	Wide	0008
RZ29B-VW	4.3GB wide disk in SBB	Wide	0014
FR-PCWVR-AY	2.1GB wide disk in SBB	Wide	8104
FR-PCWVR-AZ	4.3GB wide disk in SBB	Wide	9103

Supported SCSI Cables

The type of cables you need for your cluster depends on the hardware configuration. The following tables describes the supported cables and the context in which each cable would be used. Note that each supported cable comes in a variety of lengths. You must select cables such that the total length of the bus segment does not exceed its specified maximum.

Cable	Connector Densities	Use
50-Pin ("A")		
BN21V-0B	One high, two low	This Y cable attaches to narrow devices and can be terminated if necessary.
BN23G-nn or BN21R-nn	One high, one low	These cables connect devices and cables with different connector densities.
68-Pin ("P")		
BN21W-0B	Three high	This Y cable attaches to wide devices and can be terminated if necessary.
BN21K-nn or BN21L-nn	Two high	These cables connect BN21W Y cables or wide devices

Note: nn denotes length in meters

Supported Bus Terminators and Connectors

You need terminators and connectors for the shared SCSI bus. This table describes the supported terminators and connectors and the context in which you would use them.

Type	Description	Density	Pin	Use
Terminator				
FR-PCXAR-WJ	**Single-ended, wide terminator**	**High**	**68 pin**	**Terminates wide cables**
H879-AA (external vendor)	**Wide differential terminator**	**High**	**68 pin**	**Terminates a tri-link connector or wide differential cable**
Connector				
H885-AA (external vendor)	**Tri-link connector**	**Three high**	**Three 68 pin**	**Attaches to high-density, 68-pin cables or devices. Can be terminated if necesssary. Electrically the same as a BN21W-0B.**
BN21W-0B	**Wide Y cable**		**68 pin**	

DIGITAL FX!32 SOFTWARE DELIVERS X86 COMPATIBILITY, PERFORMANCE; DRIVES ALPHA VOLUME IN 32-BIT WINDOWS MARKET

Breakthrough Technology Scores in Key Benchmarks;
Release 1.0 Freeware Available in Late October

MAYNARD, Mass., October 7, 1996 -- Digital Equipment Corporation today announced impressive performance benchmarks and late October availability for its breakthrough technology, Digital FX!32, which enables Alpha systems to run 32-bit x86 Windows and Windows NT applications as fast or faster than they run on comparable x86 systems. The combination of Alpha's industry-leading performance -- twice the performance of x86 systems on native Windows NT applications -- and X86 compatibility through Digital FX!32 is the basis for building volume demand for Alpha in the Windows NT market. Dataquest estimates that the Windows NT market will reach 50 million units in the year 2000.

"The unique Digital FX!32 translation technology represents a new standard in the industry -- compatibility and performance through software translation," said Ed Caldwell, vice president, Digital Semiconductor, a Digital Equipment Corporation business. "With Digital FX!32, Windows applications run five to 20 times faster than they run under emulation."

According to Martin Reynolds of Dataquest, Inc., "Digital FX!32 translation technology runs x86 NT code at speeds approaching that of the fastest Intel processors. With native Alpha NT Office just around the corner, Digital FX!32 for other major applications, and emulation for legacy applications, Alpha is the only alternative to x86 processors that can do a good job with the broad Windows and DOS code base."

Benchmarks Demonstrate Advantage

Recent third-party benchmarks that measure typical x86 application performance indicate that Digital FX!32 enables Alpha systems to match or beat the performance of the same applications running on high end Pentium Pro systems. BYTE magazine's CPU performance benchmark showed that an Alpha 21164-500MHz system running a test version of Digital FX!32 was on par with a 200MHz Pentium Pro system.

Windows Magazine's Wintune95 benchmark rated the Alpha system using Digital FX!32 higher than a Pentium Pro 200MHz system in both integer and floating point performance. In typical applications such as Microsoft Word and Excel for Windows95, NSTL (National Software Testing Laboratories) tests indicated that Alpha performance under Digital FX!32 was comparable with Pentium Pro systems at 150-200MHz.

Field Test Results Positive

Digital FX!32 technology was first demonstrated at Fall COMDEX in November 1995. Since then, the product has been field-tested at companies, government agencies, and educational institutions in 28 countries, representing more than 30 industries including heavy equipment and aircraft manufacturing, financial services, telecommunications, healthcare, food processing, software development, film and video production.

"We like Alpha's performance and Digital's support, so we want to run a variety of 32-bit Windows programs -- especially publishing software -- on Alpha for advertising and other publishing functions," said Mick Kowitz, senior programmer at Gannett Media Technology International, a division of the Gannett media empire. "Digital FX!32 software offers us an immediate, viable solution. It has both speed and application bandwidth."

"With Digital FX!32, our Alpha system can run mainstream software applications like a normal PC at high performance, and also as a high-end workstation for more demanding applications," said Andy Boersma, C.I.M. analyst with NOVA Chemicals Ltd. (Canada), a NOVA Corporation subsidiary that manufactures plastics and petrochemicals at locations in Canada and the U.S. and markets them worldwide. "It is nice to have Digital FX!32 running in the background without users knowing it's there. It works just like a regular fast PC."

"With Digital FX!32, we found that we can run both x86 applications and native Alpha applications on our AlphaStation system, plus use it as a departmental server," said Greg Murphy, director of data products at Waters Corporation of Milford, Mass., the world's largest supplier of liquid chromatography systems. "Currently I run the latest version of Microsoft Office as well as Netscape Navigator, Visio, and HyperSnap, as well as native Alpha versions of Lotus Notes and other applications, all on the same machine. The high performance and compatibility of Digital FX!32 has saved us from having to buy another computer to run standard x86 applications."

Unique Technology Capabilities

Maurice Marks, technical director, Digital Semiconductor, said, "This translation technology is a unique capability that Digital Semiconductor has evolved over several years by developing three generations of binary translators: VAX to Alpha migration, MIPS and SPARC to Alpha, and now x86 to Alpha.

"Our technological advantage establishes a new standard for applying software technologies to provide cross-architecture application compatibility with no-compromise performance and ease of use," he continued. "We will continue to make enhancements of Digital FX!32 software available on a regular basis.

"Microsoft has been particularly helpful in the development and testing of Digital FX!32, sharing code, information, and compatibility tests with us," Marks added.

Digital FX!32 Availability

Digital FX!32 software, which runs under Microsoft's Windows NT 4.0 operating system, will be available free to Alpha users through several delivery methods.

* First, current Alpha users will be able to download Digital FX!32 software from Digital's World Wide Web site: **http://www.service.digital.com/FX32.**
* Second, the software will be included on Digital's Internet Roadmap CD-ROM, available free of charge.
* Third, Digital FX!32 will be factory-installed or bundled with Alpha NT systems.

Digital Semiconductor, a Digital Equipment Corporation business headquartered in Hudson, Massachusetts, designs, manufactures and markets industry-leading semiconductor products including Alpha microprocessors and PCI chips for networking, bridging, and multimedia, plus low-power StrongARM microprocessors under license from Advanced RISC Machines Ltd. Mitsubishi Electric Corporation and Samsung Electronics Company Ltd. are alternate sources for Alpha microprocessors.
WWW site: http://www.digital.com/info/semiconductor.

Digital Equipment Corporation is a world leader in open client/server solutions from personal computing to integrated worldwide information systems. Digital's Alpha and Intel platforms, storage, networking, software and services, together with industry-focused solutions from business partners, help organizations compete and win in today's global marketplace.

DIGITAL EXTENDS WINDOWS NT INTEGRATION ACROSS THE ENTERPRISE WITH THE NEW ALLCONNECT PROGRAM

MAYNARD, Mass., September 24, 1996 — Continuing its leadership position providing enterprise Microsoft Windows NT® solutions, Digital Equipment Corporation today announced the AllConnect Program — technology, service and support offerings for interoperability between Microsoft Windows NT® and UNIX, and Windows NT and OpenVMS. The new AllConnect Program leverages the success of Digital's OpenVMS Affinity Program and the Digital Microsoft Alliance for Enterprise Computing, and extends Digital's premier Windows NT Server and Workstation enterprise solutions to encompass Digital UNIX and Windows NT interoperability.

"Because our research shows that more than 90% of all organizations using Windows NT or UNIX will be integrating the two environments, this program helps fulfill an important customer need," said Mike Gallup, vice president of worldwide systems marketing, Digital Equipment Corp. "As IT organizations strive to integrate multiple operating environments, and implement distributed, cross-platform client/server applications, they are challenged with protecting hardware and software investments and incorporating new technology without disrupting or duplicating existing systems. Through the Affinity Program, Digital helped customers solve this problem by combining the strengths of Windows NT and OpenVMS. Now, as this program expands to become the AllConnect Program, we are adding solutions, service and support for those organizations integrating Windows NT and UNIX."

Through the AllConnect Program, Digital provides the key elements required to bridge UNIX and Windows NT environments: commitment to Windows NT; strong Microsoft linkage; leadership UNIX; service and support; cost-effective solutions; middleware; and applications across UNIX and Windows NT.

For those customers who wish to standardize on Windows NT across the enterprise, the Digital AllConnect Program will enable not only the coexistence of UNIX and Windows NT, but migration to Windows NT as well. Migrations from any vendor's UNIX to Windows NT on Digital systems are supported.

"With the AllConnect Program, Digital reinforces its position as a premier provider of Windows NT solutions in enterprise network environments," said Deborah Willingham, vice president of the Enterprise Customer Unit at Microsoft Corp. "Interoperability and migration are critical issues for large organizations. Digital is providing customers with the tools, products and services to achieve high levels of interoperability between UNIX and Windows NT, as well as allow migration to Windows NT in the future. Digital's cooperation with Microsoft is helping enterprise customers deploy successful Windows NT and BackOffice solutions to reduce cost of ownership and realize substantial business value."

Commitment to Windows NT

Since delivering the industry's first RISC-based platforms for the Windows NT network foundation in 1992, Digital has been providing the industry's most scalable Windows NT solutions, including Windows NT on both Intel and Alpha platforms, and added-value Windows NT Server clustering. For the future, Digital is working with Microsoft to bring Digital's expertise with 64-bit computing to Windows NT.

Now in its second year, the Digital Microsoft Alliance for Enterprise Computing represents extraordinary cooperation between the two companies to deliver technology, products, sales, service and support. Under the Alliance, Microsoft and Digital cross-licensed patent portfolios and are bringing to market Windows NT clustering solutions.

Leadership UNIX

For more than three years, Digital has been shipping complete 64-bit UNIX solutions, including a full 64-bit UNIX operating system, chips, systems and applications. Digital UNIX was the first 64-bit operating system to receive X/Open® branding for UNIX 95 and Digital UNIX enables the breakthrough performance of Digital's Very Large Memory (VLM) and UNIX TruCluster Solutions. By enabling UNIX integration with Windows NT Servers and Workstations, as well as Windows®-based clients of all types, the AllConnect Program plays a key role in Digital's overall UNIX strategy as it extends access to the high-performance capabilities of 64-bit Digital UNIX.

Worldwide Service and Support

With more than 1,000 Microsoft-certified professionals, Digital offers more Windows NT-based service and support expertise than Hewlett-Packard and Sun combined. Digital's service and systems integration capabilities specifically for Windows NT include Windows NT readiness assessment; program management; hardware, software and network audit services; interoperability testing; gap analysis; migration planning; Windows NT implementation services; and procurement and installation capabilities. In addition, Digital's Global Multivendor Services organization serves 1,300 vendors in over 100 countries.

Cost-Effective Solutions

Digital offers the industry's most scalable range of platforms for Windows NT. Digital's Intel- and Alpha-based systems provide customers with the ability to scale up from the desktop to the highest performance Windows NT solutions available. With its 64-bit AlphaServers and AlphaStations, only Digital offers a single, common hardware platform for Windows NT and UNIX, for added flexibility, freedom from migration difficulties, and investment protection. As Digital cooperates with Microsoft in bringing 64-bit Windows NT to market, today's Digital Alpha systems are ready to take advantage of the added capabilities. For further investment protection, the benefits of Digital's common hardware platform also extend to storage systems, which are interchangeable between Windows NT and UNIX systems, and Digital's network infrastructure, which does not require any changes as UNIX and Windows NT systems are integrated.

Cross-Platform Middleware

Only Digital offers all middleware components on both UNIX and Windows NT platforms. Digital's cross-platform middleware solutions include: a *complete DCE offering* across UNIX and Windows NT; *ObjectBroker*, which supports object-based distributed applications, the CORBA standard, and Microsoft's COM/OLE model; *DECmessageQ*, for general-purpose, high-speed asynchronous messaging between applications; *Reliable Transaction Router (RTR)*, for guaranteed transaction delivery in a WAN TP environment; and *Transaction Processing Solutions*, both from Digital and from partners such as BEA Systems. Digital also offers a complete Internet software solution on both UNIX and Windows NT.

Applications Across UNIX and Windows NT

Digital brings together tools which allow organizations to access and share existing software code and applications across UNIX and Windows NT environments, as well as develop and deploy new code and applications for UNIX and Windows NT. Through partnerships with leading vendors, such as Oracle, Insignia Solutions, NCD, Hummingbird Communications, Intergraph, NetManage, WRQ, Mainsoft, Bristol Technology, Softway Systems, and DataFocus, the AllConnect program ensures users that their software and application investments are protected, whether their environments are based on UNIX or on Windows NT. The program also simplifies the application environment with a suite of products for common network and systems management across UNIX and Windows NT, including POLYCENTER Manager on NetView, PATHWORKS Advanced Server for UNIX, and additional management products that are delivered through the Digital and Computer Associates Alliance for Enterprise Management.

"Oracle not only offers the leading information management software for Digital UNIX on Alpha, but we are now bringing our solutions to Windows NT on Alpha," said Robert Pariseau, vice president, Digital Products Division, Oracle Corp. "Our long-standing engineering and business relationship with Digital ensures delivery of high quality products on Digital systems, for both UNIX and Windows NT."

More information is available by sending e-mail to unix_nt@pko.mts.dec.com.

Digital Equipment Corporation is a world leader in open client/server solutions from personal computing to integrated worldwide information systems. Digital's scalable Alpha and Intel platforms, storage, networking, software and services, together with industry-focused solutions from business partners, help organizations compete and win in today's global marketplace.

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CORP/97/364

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Digital™ UNIX® and Microsoft® Windows NT™

White paper: An Extraordinary Combination

To gain competitive advantage and improve operational efficiency, businesses select the IT solutions that best match their specific application needs. As a result, the IT infrastructure of most large enterprises today includes a vast array of computer hardware, software, and networking technologies. This diverse collection of solutions has produced a complex environment with high costs for systems and network management, retraining, and purchasing upgraded or new applications.

On one hand, businesses with Windows®-based applications embrace the user friendliness and the growth path offered by Windows NT™. On the other, UNIX® systems can provide their users with the high performance, high availability, and applications these enterprises need to remain competitive.

The important question arises: ***How can Windows NT and UNIX systems be blended into <u>one</u> IT infrastructure so as to reduce complexity and cost while at the same time improving operational efficiency and reliability?***

The answer lies in the new relationship between Digital™ and Microsoft®. Today, these two companies, together with select partners, provide mature solutions to real-world integration problems: shared applications, data, mail; common systems and network management; and a single source of global support services. All these elements of interoperability contribute directly to productivity while holding the line on cost.

Industry analysts estimate that 95% of all large organizations will be using *both* UNIX and Windows NT operating systems by the year 2000. The market-wide customer challenge -- integrating UNIX and Windows NT to improve customers' competitive advantage -- is the focus of Digital's *integration-by-design*, a strategy which focuses on providing customers with integration now and investment protection for the future. Customers benefit by being able to access excellent solutions based on both Windows NT *and* UNIX -- all available in an enterprise environment, and all supported by Digital's comprehensive global service.

Integration-by-design begins with customers' current assets

Most corporations today own a mix of technology which has been purchased over a number of years. Some installations are based largely on UNIX and are just beginning to include Windows NT. Others are Windows-based and are just beginning to incorporate UNIX. It is important to understand the unique needs of each of these types of organizations in planning for *integration-by-design.*

Digital's integration solution begins with customers' current assets -- software, data, and skills. Building from current technology and user knowledge base, Digital speeds integration between UNIX and Windows NT, thereby increasing their combined contribution to the enterprise's productivity.

Digital and its partners provide benefits to customers worldwide via products and services that:

- Protect investment and lower risk

 Existing user skills, software, and data can immediately be shared across the enterprise, thereby minimizing risk to productivity. There are also methods of safeguarding the security and availability of daily transactions. Stable, quality underpinnings and service provide the rock-solid foundation for dependable computing.

- Ensure flexibility and agility

 Accelerated decision-making, thanks to improved application performance and quick adoption of new applications, can often make the difference in a customer's market position. Digital's *integration-by-design* helps customers take advantage of new advances without sacrificing productivity, security, or stability.

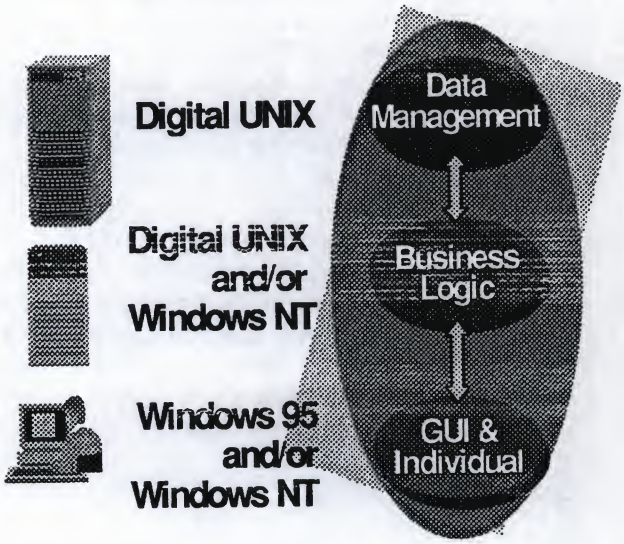
- Simplify computer management

 Simplified network and asset management eliminate the complexity and cost of supporting distributed computing environments, leaving outbound business decision-making as the only major factor in computing strategies.

Protecting current assets for future use

Customers who have built an enterprise computing environment based on UNIX expect Windows NT system users to dovetail into that environment by accessing everything from existing applications and data to equipment such as printers and specialized devices.

A Three-Tier Client/Server Architecture To Combine Digital UNIX and Windows NT



Customers adding UNIX to an existing Windows installation want to capitalize on their Windows NT applications, data, and user experience to maximize productivity. Digital enables this integration between UNIX and Windows NT for the benefit of end users, system and network managers, and software developers who want to deploy applications on either or both "destination environments."

The result?

- Freedom to deploy Windows NT on desktops and servers where it best meets user and application requirements
- Freedom to deploy Digital UNIX on servers providing UNIX applications, 64-bit performance, and high availability

Digital's solution portfolio

The greatest strength of Digital's rich solution portfolio is that it meets customers *where their assets are*. Consider these three examples which address common integration requirements:

Sharing existing applications

Windows NT users who need to share UNIX applications can do so via X Window System™, the networked graphics capability built into UNIX applications. By installing the X Window System server on a Windows NT desktop device, Windows NT users can immediately access the wealth of existing software on any of their UNIX systems. This X Window System approach requires no modification to UNIX applications -- whether purchased or written in-house -- and no modification to the rest of their Windows environment.

UNIX users who need to share Windows NT applications can share them on UNIX desktop systems by using partners' products which transparently access those applications running on a Windows NT-based server. This approach enables client/server access to the Windows NT applications without modification to the applications or to their licensing.

Sharing existing data files

Windows NT users who need to access existing UNIX files as if they were local to the NT machine can do so by mounting the UNIX file systems into their local NT domains. Network File System (NFS), the standard UNIX network file-sharing facility now available for Windows NT systems, enables NT systems to participate fully in any existing NFS environment without altering the current structure.

UNIX users can share Windows NT files in one of two ways. With the UNIX file sharing standard NFS server installed on Windows NT machines, UNIX users can include NT-resident files into their local file systems, without modification to data.

Alternatively -- and with additional benefits -- the Digital UNIX server, when installed with Digital's Advanced Server for UNIX (PATHWORKS™ v 6.0), can function as a file and print server for all Microsoft desktops. Advanced Server for UNIX provides peer-level services to your Windows NT server, including Trusted Domain support and full Domain Controller support. It supports Windows NT Management RPCs, allowing users, file shares, printers and events to be managed from native Windows NT Server Administrative Tools.

Sharing a common code pool

Developers writing code on UNIX systems can deploy that software on Windows NT machines while maintaining a single code pool. Programmers can continue to work in their familiar UNIX environment, using their known tools and utilities.

The source code written on UNIX systems can be recompiled on Windows NT, using enabling libraries from DataFocus that implement UNIX programming interfaces on Windows NT. Softway Systems provides a complete UNIX user and developer environment on Windows NT. Its implementation of POSIX passes even the US Federal Government's standards compliance tests.

The result?

- Getting from UNIX code to Windows NT executable in hours, not weeks or months
- Near-native performance of the resulting Windows NT application
- Individual modules which can be optimized for different behaviors. For example, a developer could use Windows graphics instead of X Window System graphics if desired.
- Reduced cost of overall maintenance of the application, since all this can be done from a single code pool

What's the bottom line?

- Write once, and deploy as often as you need to!

Developers writing code for Windows NT get the UNIX version without rewriting code, thanks to the availability of Microsoft Foundation Class libraries on Digital UNIX. This capability, provided by both Mainsoft Corporation and Bristol Technology, allows Windows NT source code to compile and run on Digital UNIX systems.

Using familiar Windows NT software development tools and languages such as Visual C++, developers can doubly leverage their work by producing software for both Windows NT and Digital UNIX. This tools-based migration approach reduces porting times from years to months. The tools minimize impact on productivity, maximize leverage of skills, and hasten time-to-market for the UNIX and Windows NT versions of software -- all key factors in bottom-line return on investment.

A whole greater than the sum of its parts

Even greater than the value provided individually by Windows NT and Digital UNIX is the combined value of the pair. Imagine a three-tier client/server installation with Windows NT on the desktop and middle-tier servers, and Digital UNIX powering database applications and pumping data to the Windows NT clients. Windows NT users would be able to see their results on the screen, blissfully unaware that UNIX was even involved.

Here are some examples:

- Object technology

 Digital ObjectBroker™ supports the industry standards for object technology on both Windows NT (OLE/ActiveX) and UNIX (CORBA).

- Messaging

 DECMessageQ, available on both Digital UNIX and Windows NT, provides messaging technology among multiple operating environments.

- Distributed Computing Environment (DCE)

- DCE is the strategic choice for distributed application security, naming, and networked procedure calls. Digital implements the complete DCE environment on Digital UNIX, Windows NT, and many other platforms.

Transaction processing

Integration between UNIX and Windows NT via Tuxedo and other TP monitors enables common application development and transaction monitoring.

Simplification of system and network management

System and network managers, always the first to face the issues of utilization and management of multiple systems, can work confidently from single management stations that span both the UNIX and Windows NT environments, with utilities that provide many benefits.

- Network management

 Digital - POLYCENTER™ Manager on NetView
 Digital - Solutions for Network Managers

- Capacity planning

 Computer Associates - Capacity Planner

- Software license tracking and updates

 Digital - POLYCENTER AssetWORKS™

- Automated, centralized backup of networked devices

 Digital - POLYCENTER Networker

- Common systems management

 Computer Associates - Unicenter
 Tivoli - TME10

- Common application management

 Platinum Technology - ServerVision, DBVision
 BMC - PATROL

- Common configuration management

 Platinum Technology - AutoSys, CCC/Harvest

Sometimes an "umbrella approach" is the best way to integrate and manage two different computing environments. This approach, which is most effectively employed in situations where there is a framework for linking the participants, is justified only when the environment is highly complex or when an umbrella solution provides distinct and essential additional value.

A test case: exchanging mail

Mail systems provide a simple test case for how best to meet users where their assets are. The following example explores various options for integrating different mail systems, including the umbrella approach of Digital MailWorks™.

The Microsoft mail messaging system of choice is Exchange, which uses its own communication protocol when communicating with other Exchange servers. Digital UNIX includes a mail system called "dtmail," and UNIX mail systems in general communicate between servers using the Internet mail protocol (SMTP). Communication between the Exchange and UNIX mail is best accomplished between the servers for each.

To exchange mail simply between Exchange and UNIX mail, Exchange provides an Internet mail *connector*. This connector allows each user to continue to use familiar mail interfaces, while sending and receiving mail from a different -- in this case, UNIX -- mail system.

Organizations standardizing on Exchange for both Windows NT and UNIX users can enable UNIX desktop access via a networked display of Exchange running on an NT machine. Underlying this implementation is a multi-user, X Windows-enabled version of Windows NT which runs Exchange, then displays on UNIX-based desktops, where X Windows has long been the standard networked graphics standard. Digital partners providing this mail exchange capability include Insignia, with its Ntrigue product, and NCD, with WinCenter Pro.

To provide even more flexibility, coverage, and guaranteed delivery across multiple environments, Digital also engineers mail integration products. For customers with more than two components to integrate, Digital provides MailWorks and MAILbus 400, an X.400 mail backbone which interconnects all clients and servers that support X.400. Microsoft also offers an X.400 connector for integrating Exchange with X.400 backbones.

Selected solutions that integrate

As we have seen through all the previous examples, the choice of integration strategies depends on customer assets, strategic direction, and the extent to which the installation includes other environments, such as OpenVMS™, mainframes, etc.

The product chart on the following page identifies the components required for integration, as well as some of the many solutions that provide that capability. Please note that this is not intended to provide an exhaustive list of components or solutions from Digital and its partners.

Many solutions listed here (including all the Digital products) also support integration with OpenVMS. This commonality with OpenVMS further benefits those customers' productivity by simplifying the entire environment, thereby reducing management costs.

Contact Digital for a complete list of integration and development solutions available from Digital and its partners.

Some Components Required for UNIX-Windows NT Integration

Integration Ability Enabled	Solutions for UNIX-oriented Customers	Solutions for Windows-oriented Customers
File Sharing	Hummingbird, Intergraph, NetManage, NCD	Digital PATHWORKS with Advanced Server for UNIX
Application Sharing	Digital, Hummingbird, Intergraph, NetManage, WRQ, NCD	Insignia, NCD
Software License Mgt	Digital POLYCENTER AssetWorks	Digital POLYCENTER AssetWorks
Automated Backup	Digital Networker Save and Restore	Digital Networker Save and Restore
Capacity Planning	Computer Associates Capacity Planner	Computer AssociatesCapacity Planner
Network Management	Digital POLYCENTER Manager on NetView	Digital POLYCENTER Manager on NetView
Common Database Environments	Oracle Sybase Informix Software AG	Oracle Sybase Informix Software AG
Object Technology	Digital ObjectBroker plus many partners	Digital ObjectBroker plus many partners
Cross-platform code	DataFocus, Inc. Softway Systems	Mainsoft Corporation Bristol Technology
Systems Management	Computer Associates, Tivoli	Computer Associates, Tivoli
Transaction Processing	BEA Tuxedo, Digital Reliable Transaction Router (RTR)	BEA Tuxedo, Digital Reliable Transaction Router (RTR)

Why Digital?

Simpler choices

Large computer purchases can be very complex. First, there is the need to characterize project requirements and strategies for the environment. Introduce conflicting advice from consultants, press, and vendors regarding which systems are better and last longer, and the considerations can become overwhelming.

Digital assists customers in these situations by clarifying options and by providing simple combinations of systems. Into each system and operating environment, Digital engineers the technology needed for integration with other systems and environments. Customers are thereby protected from paying "hidden penalties" for specific choices.

In this way, Digital enables its customers to evaluate each system purchase based on application availability, price/performance, user preference and skill set.

Accountability

Responding to customer input, Digital manages Windows NT and Digital UNIX, Alpha and Intel hardware platforms, from a single Computer Systems Division. Since the introduction of Windows NT by Digital, they have been managed together. While internal organization is not of prime concern to customers, it does directly contribute to proper design of integrated environments, and result in balanced and complete solution consulting to customers.

Common hardware

Digital has engineered the hardware underpinnings of its strategic operating systems for maximum benefit to customers, whether those customers choose Windows NT, UNIX, or a combination.

- Alpha™ systems and workstations

 Digital is the only vendor to support both UNIX and Windows NT on a single RISC processor, using its blazingly fast 64-bit Alpha architecture.

- Network infrastructure

 This includes terminal servers, bridges, routers, and coaxial and fiber optic cabling.

- Storage subsystems

The result of all this is protection of customers' hardware investment.

Consider, for example, a project with several Alpha systems running Digital UNIX. At project completion, the Alpha systems can be re-deployed with Windows NT -- including big-ticket items like storage subsystems and network infrastructure -- for maximum long-term value.

Worldwide service for mixed environments

Digital provides service for both the UNIX and Windows NT components of your installation, as well as for your network, including everything from design to wiring. And, since 1991, Digital has served customers by maintaining their equipment from other vendors as well. This single-source service for multivendor environments has simplified resource management for customers worldwide. Today, Digital provides global service for Microsoft Windows NT, with over 1,500 committed support professionals certified by Microsoft, approximately 34% of whom have been cross-trained in UNIX.

Digital UNIX: a mature and powerful operating system

Digital UNIX Version 4.0, shipping today, is the 11th release of Digital's high-performance 64-bit UNIX operating system. Compliant with all key industry standards -- including the emerging 64-bit standard -- Digital UNIX ensures customer investment protection like no other version of UNIX can.

Other UNIX suppliers are announcing their plans for migrating to 64-bit operating systems, but Digital *already* provides a reliable 64-bit environment, including a complete portfolio of applications and enabling technologies. Customers deploying Digital UNIX today are protected from unnecessary migrations because years ago Digital completed the underlying architectural changes which would ensure their safety well into the future.

Hundreds of thousands of users are benefiting from the breakthrough performance of Digital UNIX 64-bit systems today and are already redefining the productivity of their IT investments. Their decision support systems have become interactive processes, rather than cumbersome activities with days spent waiting for results.

From single CPU configurations, to symmetric multiprocessors, to clusters of Alpha systems, Digital UNIX offers the fastest raw performance and the best price/performance in the industry. And its scalability ensures easy, secure, long-term growth paths and investment protection.

Digital UNIX TruCluster systems, with up to 14 gigabytes of main memory per system -- Very Large Memory is enabled by 64-bit architecture -- not only reduce database seek times from hours or days on competitors' systems to minutes or hours on Alpha systems, but also provide high availability. Cluster members sensing trouble on co-members absorb the workload, restart applications, and resume service to users without operator intervention. And, because no idle standby systems are required, all machines always contribute to the workload.

The bottom line? Digital UNIX systems provide the power, high availability, and scalability required for the top and middle tiers of three-tier client/server environments.

The Alliance for Enterprise Computing

When Digital and Microsoft formed the Alliance for Enterprise Computing, their goal was to support customers' deployment of Windows NT throughout the enterprise. The Alliance has since matured to provide the foundation upon which integration of Digital and Microsoft technology, service, and marketing efforts is based.

Key results of the Alliance:

- There are now more than 1,500 Digital support professionals worldwide who are certified by Microsoft as Windows NT experts. This means there is a single source for global service of mixed installations.
- Microsoft now licenses Digital's cluster technology.
- There is now joint support for customers implementing Windows NT.
- There are now co-located engineering resources, thus ensuring rapid adoption of new technology and lockstep provision of products.
- Digital now sells and supports Microsoft Backoffice.

Microsoft engineers UNIX integration into Windows NT

Microsoft now ships Windows NT bundled with many UNIX integration enablers, and more are offered as add-on products. For example, Windows NT for workstations and servers includes TCP/IP, the network protocol standard for UNIX environments, as well as *lpr* printing services which allow Windows NT users to spool print jobs to networked UNIX systems.

UNIX users will value the inclusion of TCP/IP-related services such as *ping, dns, DHCP and WINS, ftp, rcp, and telnet*. UNIX commands found in the Windows NT resource kit include: *ar, cat, cc, chmod, chown, cp, find, grep, ld, ls, make, mkdir, mv, rm, rmdir, sh, tape, touch, vi, wc and windiff*. These common commands for tasks such as listing, viewing, copying, and deleting files, assist UNIX users in their daily use of Windows NT by minimizing the amount of retraining required to move to the new environment.

Available separately, Microsoft SQL Server provides Windows NT systems users with the UNIX standard for database access (SQL), enabling Windows NT users and applications to access existing UNIX-resident databases.

Digital designs hardware for Windows NT performance

In cooperation with Microsoft, Digital now engineers a range of Alpha server and desktop systems running Windows NT, as well as a complete family of Intel-based machines. The result is the broadest range of systems available in the industry all tuned to accelerate Windows NT performance. This scalability yields high returns in investment protection to customers choosing Windows NT systems from Digital.

Digital clusters for Windows NT

In addition to the hardware platforms mentioned above, Digital engineers middleware and core technology for Windows NT to further enhance customer productivity.

Digital recently introduced Digital Clusters for Microsoft Windows NT Server. As customers move to Windows NT Server, they can now ensure that their business-critical applications such as transaction processing and decision support will remain available at all times to all users.

Unlike competitive high availability file servers based on Windows NT, Digital's implementation leaves no hardware idling in standby mode; failover is transparent to users; scheduled maintenance can be performed without disruption; and the cluster is managed through a user-friendly graphical interface. Additionally, Digital has the only cluster solution available for both Intel and RISC servers.

The first release of Digital Clusters for Windows NT Server supports failover of the Oracle7 Workgroup Server V7.2 database on both Intel and Alpha servers. In addition, Digital is working closely with Oracle to deliver Oracle Parallel Server on Digital Clusters for Windows NT.

In summary

No one but Digital can provide the fastest, highly available UNIX backend systems for database or enterprise applications. Similarly, Digital Windows NT systems provide performance and highly available applications on the frontend. The combination is, among all competitors, unbeatable.

Digital's commitment to both Windows NT and UNIX results in *integration-by-design*, focused where customers need integration now and preservation of investment over years of use. Customers can realize immediate benefits through simple integration of the best Windows NT-based and UNIX-based solutions in a complete, dependable enterprise environment, all supported by Digital's comprehensive solution portfolio and global service.

To request the May 1996 edition of the Digital UNIX and Windows NT Interoperability Guide, or for more information, contact Digital by electronic mail at:

unix_nt@ics.enet.dec.com

or visit us on the World Wide Web at:

http://www.digital.com/

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Microsoft NT makes C2 on Alpha AXP and Intel

Microsoft Windows NT v3.5 (not v3.51) running on ***Alpha and Intel*** platforms has been certified to be ***C2 level security*** compliant by the National Computer Security Center (aka. NSA). Windows NT is now on the Evaluated Products List, the EPL.

Note that Windows NT on MIPs was not tested (and PowerPC support was unavailable until v 3.51).

AS OF DATE: 31 JULY 1995
PRODUCT: Windows NT Workstation and Windows NT Server Version 3.5 with Service Pack 3
VENDOR: Microsoft Corporation

OVERALL EVALUATION CLASS: C2

PRODUCT DESCRIPTION:

Microsoft Windows NT Workstation and Windows NT Server Version 3.5 aremodern, 32-bit, graphical-oriented operating systems that support popularWindows-based applications, preemptive multitasking, and symmetricmultiprocessing (SMP). The Microsoft Windows NT Service Pack 3 for WindowsNT Workstation and Windows NT Server must be included to be in the evaluatedconfiguration. The operating systems, in their evaluated configurations, runon both Intel-based and Digital Alpha systems.

Windows NT Server has been optimized for network performance. It wasdesigned to provide not only file and print services, but also a robustplatform for client-server based applications. Windows NT Server provides anumber of graphical administration tools, and fault-tolerance features suchas disk striping with parity (RAID 5). In the evaluated configuration,Windows NT Server supports up to 4 processors.

Windows NT Workstation is a 32-bit desktop operating system. It supportsapplications designed for MS-DOS, Windows 3.x, and Windows NT. It featurescomplete crash-protection for both applications and the base operating systemand preemptive multitasking. In the evaluated configuration, Windows NTWorkstation supports up to 2 processors. Because the evaluated configurationdoes not include a network environment, both products are consideredstand-alone workstations. The security relevant differences between WindowsNT Workstation and Windows NT Server in the evaluated configuration areminimal. The products are generically referred to as the Windows NTplatform.

The Windows NT platform has been designed from its inception to be a secure operating system. Most importantly, it includes graphical administration tools that allow administrators to easily manage discretionary control and monitor all relevant security information for the operating system. The Windows NT platform also provides the ability to write security-relevant information into a security log to allow administrators to monitor their secure systems.

The Windows NT platform includes a secure logon sequence (using the Ctrl-Alt-Del key sequence), which prevents applications from trapping the username and password sequence. Coupled with the account lockout capability, failure to enter the correct password after a specified number of attempts
prohibits unauthorized users from accessing critical data.

The Windows NT platform ensures data protection using discretionary accesscontrol. The Windows NT security model allows users to apply access controlsto all system objects and all files using the native Windows NT file system (NTFS). Before an application or process can open a handle to any object -including file or data objects - the Windows NT security system transparently verifies that the process has the appropriate authorization. The Windows NT platform ensures that no process can access a file unless the file's owner or a system administrator permits it.

EVALUATION SUMMARY:

The security protection provided by the Microsoft Windows NT platform when configured according to the Windows NT Trusted Facility Manual, has been evaluated by the NSA. The security features of the Windows NT platform have been examined against the requirements specified by the Department of Defense TCSEC dated December 1985.

The NSA evaluation team has determined that the highest level that Windows NT Workstation and Windows NT Server, Version 3.5, combined with Microsoft Windows NT Service Pack 3 satisfy all the specified requirements of the criteria is class C2. For a complete description of how the Windows NT
platform satisfies each requirement of the Criteria, see Final Evaluation Report, Microsoft, Inc., Windows NT Workstation and Server, Version 3.5 with U. S. Service Pack 3 (Report CSC-FER-95/003).

A system that has been rated C2 provides a TCB that enforces a DAC policy to protect information and allow users to share information under their control with other specified users, identification and authentication of users in order to control access to the system and enforce accountability, prevention
of access to residual information from a previous user's actions, and provides for the auditing of security related events. The hosting hardware for the Windows NT platform in the evaluated configuration is the Compaq Proliant 2000 and 4000 (Pentium) and the DECpc AXP/150 (Alpha).

Additionally, the Windows NT platform was examined against the B2 Trusted Path and B2 Trusted Facility Management functional requirements of the TCSEC. A system that satisfies the B2 Trusted Path functional requirement supports a trusted communication path between itself and the user for identification and authentication. A system that satisfies the B2 Trusted Facility Management
functional requirements supports the ability to separate operator and administrator functions. Although the Windows NT platform satisfies these functional requirements at the B2 level, it was not evaluated against any assurance requirements above its rated C2 level.

The Microsoft Corporation plans to participate in the Rating Maintenance Phase (RAMP). Microsoft Corporation intends to add different platforms as well as new processors to the evaluated configuration. A network configuration of the Windows NT platform is currently pending evaluation agreement.

EVALUATION STRENGTHS:

Microsoft Windows NT Workstation and Windows NT Server are modern, 32-bit, graphical-oriented operating systems that provide support for popular Windows-based applications, preemptive multitasking, and support for symmetric multiprocessing (SMP). The Windows NT platform combines the ease-of-use of the popular Windows interface with the reliability and security of the Windows NT operating system. Users can expect to run mainstream applications, such as Microsoft Office, and programs designed for MS-DOS in a secure environment.

Security was one of the base design goals for the Windows NT operating system. As such, security is pervasive throughout the operating system. The security model includes graphical administration tools that allows administrators to control who accesses all system objects - such as individual files and printers - what type of control they have over system objects. The operating system further includes tools to manage users, backup data, control printers, manipulate file and directory access controls, and to administer the overall system.

Digital Windows NT RISC Web Servers

Leveraging the customer benefits of the Digital-Microsoft relationship

Market leader extends industry's most complete Internet server line

ATLANTA, Georgia, Networld+Interop 95 -- September 27, 1995 --
Digital Equipment Corporation today unveiled new Internet-ready AlphaServer systems, enhancing the industry's most complete line of Internet systems, and offering customers even more powerful and affordable access to the World Wide Web (WWW), including:

- New Microsoft Windows NT Web AlphaServer systems, the first RISC-based Windows NT Web servers on the market, preconfigured with Web server software for commercial Internet users, and powered by a faster Alpha micro-processor. Digital also disclosed superior benchmark data for the new systems.

- Easy Web Server, an entry-level Windows NT system prepackaged with everything users need to be up and running on the WWW in under 10 minutes.

- New Rackmount AlphaServer systems for the Internet, offering the exceptional performance, high availability, and saving features of rackmount AlphaServer systems preconfigured with Windows NT or Digital UNIX server software.

Separately, Digital announced that, according to Computer Intelligence InfoCorp, of La Jolla, Calif., Digital is now the market share leader in the low-end UNIX RISC server market.

"Our new Windows NT Web AlphaServer systems offer customers the combined benefits of the industry's most powerful, cost-effective Internet servers and our close relationship with Microsoft."

"These developments, together with Digital's newly documented market leadership, are exciting news for both Digital and our customers."

"As the first vendor to offer Internet-ready systems for both Windows NT and UNIX environments, Digital offers customers one-stop-shopping for all their Internet server needs."

Pauline Nist, vice president of the AlphaServer Business Segment

Windows NT Web AlphaServer Systems

The new Windows NT Web AlphaServer systems are preconfigured Internet-ready Web servers that offer users fast, reliable access to the expanding universe of the WWW. They include the uniprocessor NT Web AlphaServer 1000 4/266 and NT Web AlphaServer 400 4/233 versions of Digital's popular network servers, as well as the entry-level NT Web AlphaStation 200 4/100 system.

These systems include everything users need to create and operate Home Pages on the WWW and for Web viewing. Each system includes Purveyor Web Server V1.1 software from Process Software Corporation, plus a long list of other WWW software, including a Gopher server, FAX server, WWW browser and "helper" applications, and authoring tools.

According to Scott Purcell, president of HLC-INTERNET, of Irvine, Calif.,

"Digital's new NT Web AlphaServer systems round out the industry's fullest, most powerful and affordable line of Internet-ready systems. Digital's experience, pace-setting technology, and business relationships offer customers a smooth growth path as the Internet grows as a commercial tool."

NT Web AlphaServer systems are ideal for users currently operating in a Microsoft Windows environment who want a seamless, affordable path to WWW publishing. All are backed by Digital's industry-leading, three-year hardware warranty and comprehensive software support services.

The power, reliability and management features of the NT Web AlphaServer 1000 4/266, upgraded using a 266MHz Alpha microprocessor, make it an ideal platform for housing Internet information repositories, for hosting Home Pages, or for use in Internet commerce, where customers need continuous up-time with little or no on-site support.

The performance and expandability of the NT Web AlphaServer 400 4/233, also upgraded using a 233MHz Alpha microprocessor, make it well-suited for publishing information on the Internet, for use as a listserver or mailserver, and for Internet collaboration and communication, where customers may need to grow without investing in an entirely new system.

As an entry-level WWW server, the 100MHz NT Web AlphaStation 200 4/100 offers exceptional performance at an affordable price and is designed as a Web page authoring platform.

These systems are available now, the NT Web AlphaStation 200 4/100, the NT Web AlphaServer and the NT Web AlphaServer 1000 4/266.

The new, faster AlphaServer 1000 4/266 and 400 4/233 systems are also available as network, database, and application servers for Windows NT, Digital UNIX, and OpenVMS operating systems. These systems are packaged without Internet software, which can be purchased separately for any Alpha system. Prices for the AlphaServer 1000 4/266 remain unchanged, beginning at $15,970 for a system with 64MB of memory, 2.1GB disk, PCI Ethernet adapter, and CD-ROM drive.

Easy Web Server

The new Easy Web Server is a fully configured and tested turnkey solution designed for first-time Internet users developing Home Pages for the WWW. Based on a 166MHz PCI-based

Windows NT system, Easy Web Server systems come preconfigured with everything users need to get up and running on the Internet, including Netscape Communications or Purveyor server software, plus Netscape Navigator.

Superior Internet AlphaServer Benchmark Data

Based on benchmark testing performed by Digital, the new Internet AlphaServer systems far outperform the competition. For example, in the Internet Performance Benchmark, using Netscape Communications Software V1.1 for Digital UNIX, the AlphaServer 400 4/233 was able to support 106,680 16K files per hour, compared with 66,188 files on the Sun Netra i20 system, a 60 percent advantage. Yet the uniprocessor Alpha systems cost considerably less than the two-CPU Sun system. The AlphaServer 1000 4/266 scored an even higher 136,052 files accessed per hour; it, too, costs less that the Netra i20.

In a financial software benchmark using Microsoft SQL Server V4, the AlphaServer 1000 4/266 system performed 284,790 transactions per hour, more than 2.6 times faster than the Compaq ProLiant 1500 running at 100MHz.

In benchmarks certified by AIM Technology (UNIX System Performance Guide, Fall 1995), the AlphaServer 1000 4/266 turned in not only superior performance but exceptional value as well. For example, the system outperforms the IBM RS/6000 PowerServer C10 by 3.5 times and the Tricord DS1000/5100 Pentium 100MHz by 2.6 times, and provides better price/performance than the Compaq ProLiant 4000 and Fujitsu-ICL Superserver J534i.

Rackmount AlphaServer Systems for the Internet

The new Rackmount (RM) AlphaServer systems for the Internet are ideally suited for Internet Access and Internet Service Providers, whose business needs may demand multiple servers for managing Internet publishing and authoring, for commercial information and application server support, or for information sharing and collaboration.

Available immediately are the RM AlphaServer 1000 4/266 and the RM AlphaServer 2100 4/275 systems for the Internet.

The RM AlphaServer 2100 4/275 for the Internet is based on Digital's award-winning 275MHz symmetric multiprocessing (SMP) server, offering up to four Alpha microprocessors, 2GB of main memory, and excellent expandability, with support for either Windows NT or Digital UNIX.

Each system includes a wide selection of prepackaged, pretested Internet software to make Internet access powerful and easy, such as Netscape Navigator for Digital UNIX, Purveyor for Windows NT, and Digital's ELECTRONIC LOCKER for simplified yet powerful system administration.

Digital Equipment Corporation is the world's leader in open client/server solutions, from personal computing to integrated worldwide information systems. Digital's scalable Alpha platforms, storage, networking, software and services, together with industry-focused solutions from business partners, help organizations compete and win in today's global marketplace.

digital™

POLYCENTER Solutions for Network Managers for Windows NT

Extending the power of your NetView management solution

In today's world, if your network is down, so is your business. That's why it's never been more important to have effective management tools to ensure availability and maximum performance of your network. POLYCENTER Solutions for Network Managers gives you the power to optimize your network management system. To get the right management information — when you need it — for mobile users, DECnet devices, Digital bridges, and terminal servers. And keep your business up and running.



The fact is, your network must handle a complex array of systems and users. You've got more and more nodes competing for fewer and fewer TCP/IP addresses. Mobile users are hopping on and off the network at random intervals. And, with investments in DECnet devices, Digital bridges, and terminal servers, an out-of-the-box SNMP manager just won't cut it.

POLYCENTER Solutions for Network Managers is the right solution at the right time. With this powerful package, you get:

- **DHCP Manager,** allowing TCP/IP addresses to be assigned to new nodes or mobile devices automatically and monitored on a DHCP submap.
- **DECnet Manager,** giving you industrial-strength, multiprotocol management from a PC running POLYCENTER Manager on NetView® for Windows NT.™
- **SQL Integration,** enhancing your NetView solution through a fast events processing subsystem — sending topology status events to an open SQL database.

POLYCENTER Solutions for Network Managers delivers management capabilities that get to the heart of your networking challenges — extending the value of your NetView platform — and placing critical network information and control at your fingertips.

Benefits

- **Manage your move to mobile computing without bringing down your network**
- **Control your multiprotocol, multivendor network from a single console**
- **Rapidly identify and resolve problems before they affect users**
- **Minimize network delays and downtime — and maximize business productivity**

A power pack of network management tools

POLYCENTER Solutions for Network Managers is a complete, integrated set of management modules, giving you powerful tools that are easy to set up and use. Now you have more power to effectively identify network problems and resolve them quickly.

DHCP support to manage your move to mobile computing

In an industry first, Digital delivers Dynamic Host Configuration Protocol (DHCP) support and management for network operators, allowing TCP/IP addresses to be assigned to new nodes or mobile devices automatically. That way, users don't have to wait for administrators to assign addresses, and mobile users don't have to hoard addresses just to ensure network connectivity.

While most management systems buckle under the onslaught of anomalies created by DHCP technology — including poorly formed maps, incoherent topologies, and misleading events — Digital's POLYCENTER Solutions for Network Managers handles them with ease. The network operator can focus on real problems. So you can easily make the move to mobile, without bringing down your network.

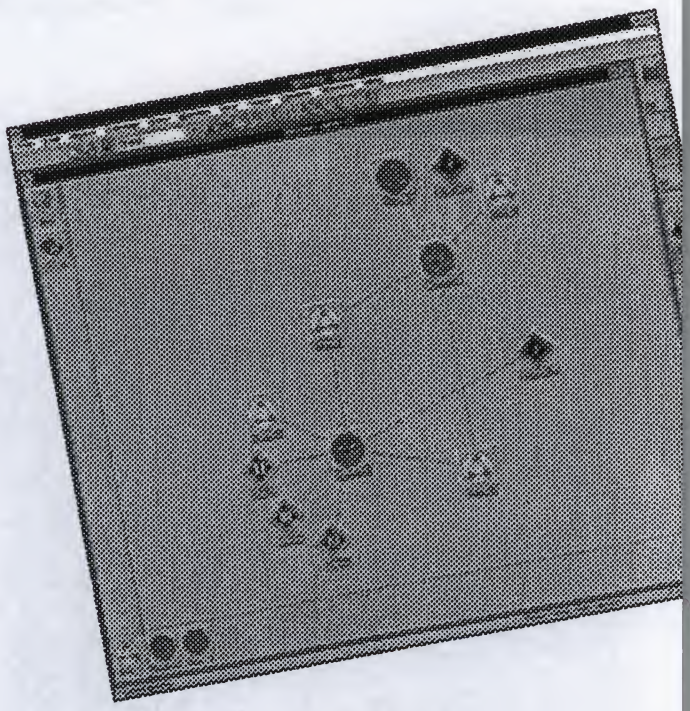
In fact, our DHCP Management module maintains the integrity of the IP submap and ensures you reap only the benefits of DHCP technology with none of the drawbacks. The secret is the General Topology Manager (GTM) application programming interface (API) — exclusively available on NetView platforms. Using the GTM API, essential DHCP node information is stored in a special DHCP submap, with objects identified by name and the last address assigned to them. You can easily track DHCP nodes — even though they periodically connect, disconnect, and reconnect to the network — and immediately determine the activity status of each node, thanks to color-coded icons. In seconds, you'll know exactly where the device is within your network. The database allows you to see how many times users are logging in and out.

DECnet Manager for multiprotocol network management

The DECnet Manager module tightly integrates with POLYCENTER Manager on NetView for Windows NT. This winning combination gives you industrial-strength, multiprotocol management from a low-cost Windows NT PC. You get comprehensive tools for configuration, fault, and performance management of both your TCP/IP and DECnet devices, plus network management graphs.

For years NetView on UNIX® has had the top-rated interface. NetView on NT now introduces exciting "third-generation" enhancements to this interface, based on Windows® 95 style conventions. DECnet Manager takes advantage of this intuitive interface, making network management a breeze. You also have the option of using a full range of network and object management commands through a convenient dialog box. Whatever your preference, POLYCENTER Solutions for Network Managers gives you the tools to manage your DECnet environment.

DECnet Manager also features automatic discovery, layout, and status of devices on your network. With a simple click of the mouse, DECnet Manager displays a high-level, color-coded



Color-coded submap shows status at a glance.

topology map with all the DECnet nodes in your network, including inter-area routers, segments, and network domains. As a device's status changes, DECnet Manager changes its color on the submap. Maps can be easily tailored to meet your specific needs.

DECnet Manager even lets you monitor multiple maps simultaneously, using a unique icon-driven Navigation Tree. Summary status icons convey the overall status of individual submaps. So, there's no need to wade through multiple windows. And you get early problem detection, better end-user service, and optimal use of your network resources.

You can control your DECnet devices through a choice of graphical interfaces or command mode:

- NCP commands for DECnet Phase IV objects
- ELMS commands for bridge, extended LAN, and DECconcentrator (RBMS) management

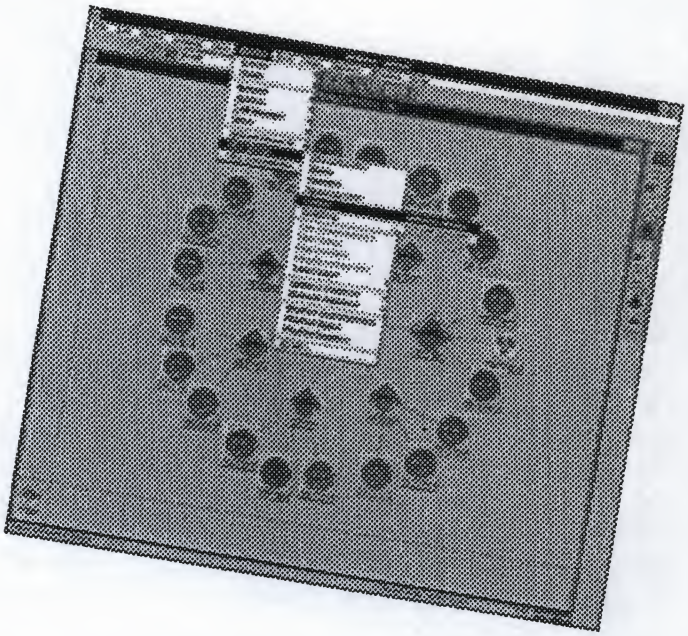
DECnet Manager device recognition

DECnet Manager provides the autodiscovery, layout, status, and management of:

- DECnet Phase IV and DECnet/OSI routers and end nodes — including SNMP MIB II managed multivendor DECnet, and DECNIS routers
- Bridges — including LAN bridges and DECbridge 5xx/6xx devices in extended LAN and FDDI network environments
- Terminal servers — via separate topology, status monitoring capabilities, and object management functions
- FDDI devices

SQL integration to enhance your NetView solution

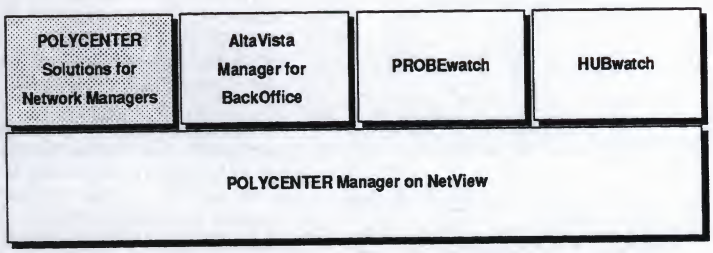
Based on the Open Database Connectivity (ODBC) standard, an integral SQL module in POLYCENTER Solutions for Network Managers enhances your NetView management solution by sending events to an SQL-compliant database. This super-charged event engine can rapidly process large volumes of TCP/IP and DECnet events. What's more, you get standard SQL access to all network management information, including IP topology, events, and status. So you can create custom reports and applications from your NT™ management station, or any of the many clients that support SQL.



The graphical user interface is instantly familiar to Windows users.

Leverage your investments as you grow

If you're already a POLYCENTER Network Manager 200/300/400 user, you'll find an easy migration path to POLYCENTER Solutions for Network Managers for Windows NT. In fact, a special migration feature, Data Collector Event Sink, lets you continue using a DECmcc management station to send events to, and receive events from, POLYCENTER DECnet Manager. So, you can leverage your knowledge of your existing system, while taking advantage of the powerful capabilities in POLYCENTER Solutions for Network Managers for Windows NT.



POLYCENTER Manager on NetView for Windows NT provides the framework for integrating your network and system management applications, such as POLYCENTER Solutions.

digital™

A complete portfolio of solutions

The POLYCENTER portfolio provides closely interrelated network and systems management solutions to control your complex computing environment. And many Digital products can be used with POLYCENTER Solutions for Network Managers for Windows NT to complement your network management system, including the following:

- HUBwatch
- AltaVista Manager for BackOffice®
- ServerWORKS Manager
- PROBEwatch

Hardware/software requirements

Minimum for Intel PCs

- Intel® 486, 66 MHz processor; for larger networks, Intel Pentium® processor
- Windows NT Workstation or Server V3.51
- POLYCENTER Manager on NetView for Windows NT V3.1
- NTFS drive with at least 100 MB of available disk space; for larger networks, 500 to 1000 MB recommended
- 120 MB paging space
- 48 MB of RAM; for larger networks, use 48 to 64 MB of RAM
- Network adapter card
- SVGA graphics card and monitor (minimum 800 × 600 pixels); 1024 × 768 pixels provides better resolution
- TCP/IP installed and configured
- Membership in the Administrators Group
- PATHWORKS for Windows NT V4.1B with the DECnet protocol installed and configured (when using the DECnet Manager components)

Minimum for Alpha PCs

- Any Alpha processor that supports Windows NT V3.51
- Windows NT Workstation or Server V3.51
- POLYCENTER Manager on NetView for Windows NT V3.1
- NTFS drive with at least 130 MB of available disk space; for larger networks, 500 to 1000 MB recommended
- 120 MB paging space
- 64 MB of RAM; for larger networks, use 64 to 96 MB of RAM
- Network adapter card
- SVGA graphics card and monitor (minimum 800 × 600 pixels); 1024 × 768 pixels provides better resolution
- TCP/IP installed and configured
- Membership in the Administrators Group
- PATHWORKS for Windows NT V4.1B with the DECnet protocol installed and configured (when using the DECnet Manager components)

For more information

For more information on POLYCENTER Solutions for Network Managers for Windows NT or any of Digital's POLYCENTER solutions, contact your local authorized Digital reseller. In the United States, for the name of the reseller nearest you, call 800-407-8211.

Ordering information

Licenses and kits	
QB-4MTAA-SA	License, CD-ROM, User Guide Package
QM-4MTAA-AA	License only
QA-4MTAA-GZ	User's Guide Documentation-only Kit

Services	
QT-4MTAA-XA	Package Product Service
QT-4MTAA-TA	New Version License Service
QT-4MTAA-ZA	Software Telephone Support

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digital

POLYCENTER™ AssetWORKS

The industry's most comprehensive asset management solution

Multivendor Customer Services from Digital

As a network manager, you're already benefitting from having Microsoft® Systems Management Server (SMS) on your network. But do you know exactly *what* software is being used, *when*, and *where* on the network? POLYCENTER AssetWORKS brings you the benefits of better resource utilization, reduced software lifecycle costs, improved inventory management, more efficient upgrade planning, and enhanced service to your users.



Full integration with Systems Management Server

AssetWORKS and SMS work together to provide comprehensive configuration management capabilities. Management functions are available right from the SMS Administrator console—and that's just the beginning of its full integration. AssetWORKS utilizes the SMS infrastructure, including site servers, logon servers, and clients. And, it extends SMS software distribution and installation capabilities to industry-leading UNIX and OpenVMS systems. If you know how to use SMS, then you already know how to use AssetWORKS!

Cost-effective decision support

Digital's industry-leading, enterprise-wide, asset management solution automatically collects hardware and software configuration data, meters software usage, distributes applications and upgrades, and generates valuable management reports for cost-effective decision support.

Highlights

- Meters and audits software usage across a network
- Graphically reports on software usage and other asset information
- Extends SMS capabilities of collecting and maintaining hardware and software inventory for computers across your enterprise environment, including UNIX and OpenVMS platforms
- Automates software installations and upgrades at remote sites
- Consolidates and organizes configuration and inventory data in a central database—automatically

Software metering for optimized, cost-efficient usage

While SMS inventories what software is installed on your hard disks, you also need to know just *what* is being used, *when* and *where*. With AssetWORKS PC clients added to your SMS configuration, you gain insight into your software usage and upgrade needs.

Metering lets you collect application usage information for specified, individual software packages. Using the SMS Administrator, you specify the applications you want to track. AssetWORKS detects and records which applications are running on your network at a given moment. If the application is run from the server, AssetWORKS tells you when it is being run and by whom.

Auditing lets you automatically discover and measure usage of all the software applications running on computer systems in your network; you do not need to specify a particular application.

Comprehensive reporting

From the SMS Administrator console, you can view and print many valuable metering reports that help you graphically understand the usage of all your software, including number of users and how heavily each application is being used.

Reports can be generated in graphical and text format; they can focus on general software application usage, server application usage, site/domain application usage, comparative application usage and application execution locations. Many other inventory and job reports are also available.

Report data can be exported to Microsoft Excel™ for additional analysis. Digital's AssetWORKS supports the use of third party report generators such as Microsoft Access™.

AssetWORKS provides over 50 preformatted templates based on SMS general reports. You can use them as is, modify them as needed, or create additional templates based on the metering or general SMS report drivers.

Benefits of metering

AssetWORKS metering provides substantial benefits:

•

Better utilization of licensed software

You can discover underutilized licenses on local hard disks and on the server, which you can then redeploy more effectively

•

Better planning of software acquisition and upgrades

Metering reports show you wh uses each application and how heavily—improving the effectiveness of your initial purchas and upgrade decisions.

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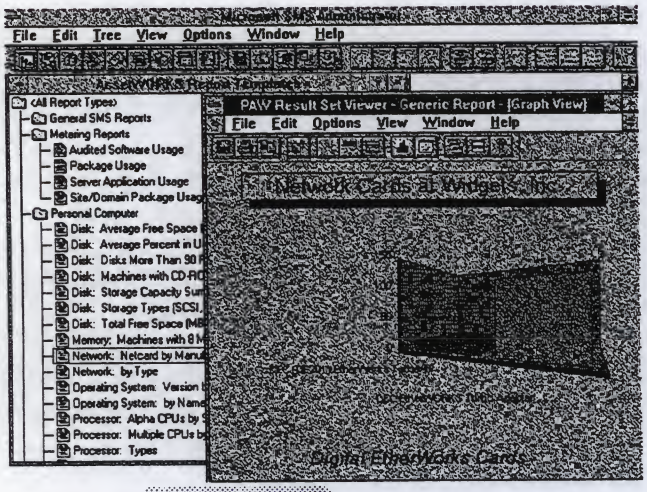
Accurate compliance verification

By comparing the metering da with the number of licenses fo a given application, you can ve ify your compliance with license requirements.

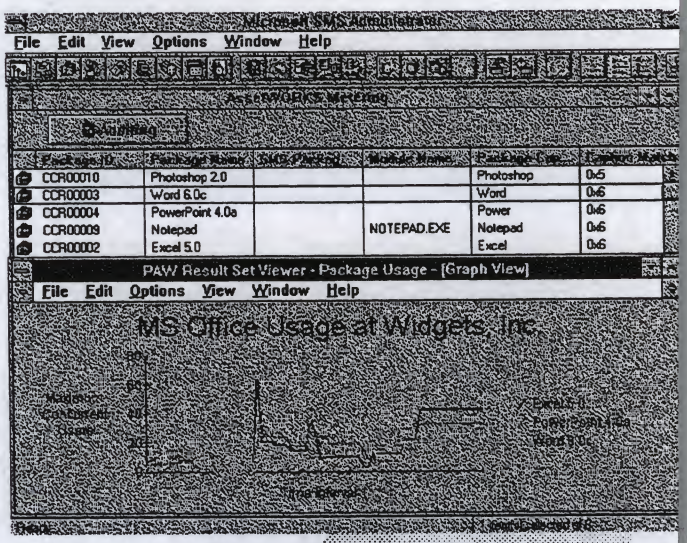
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User-transparent monitoring

Metering and auditing are no intrusive background functio Your users are never locked ou of the applications they need.



AssetWORKS adds graphical reports to SMS Administrator. In addition to communicating metering results, these reports can be used to graphically depict the SMS inventory.



AssetWORKS adds support for soft ware usage metering and auditi to SMS. Metering rules are defi directly from the SMS Adminis trator console, and results are di played graphically.

Extending SMS functions to OpenVMS and UNIX

AssetWORKS operates as a robust extension to SMS capabilities. It extends SMS software distribution and installation capabilities to industry-leading UNIX and OpenVMS systems. From an AssetWORKS-enabled SMS Administrator console, you can easily drag and drop UNIX and OpenVMS packages to target systems.

AssetWORKS also extends SMS inventory to UNIX and OpenVMS systems. It collects hardware and software configurations regularly and automatically. This information is integrated as inventory into SMS and the user interface so that you can manage your complete systems environment from a single console.

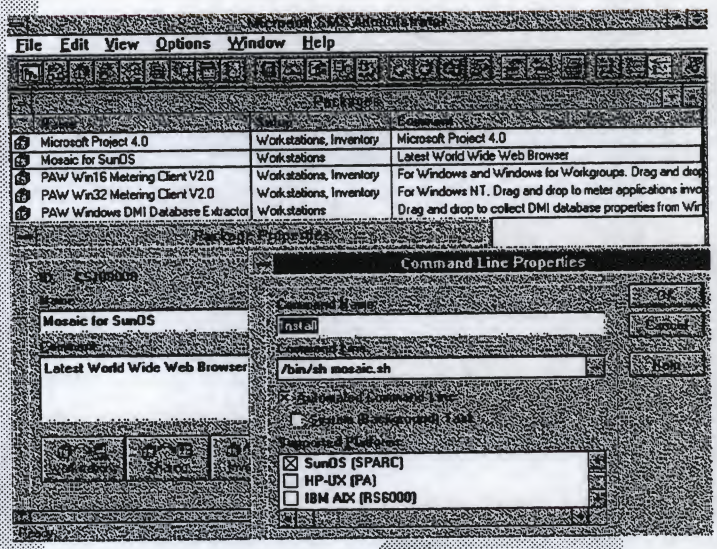
AssetWORKS extends the SMS Management Information File (MIF) capabilities to support the MIF Entry utility on Digital UNIX, ULTRIX™ and OpenVMS client systems, enabling you to add new groups to your inventory. And you can customize UNIX inventory group descriptions to tailor inventory data collection to your own needs.

AssetWORKS collects Desktop Management Interface (DMI) database properties from SMS client systems that are DMI-enabled and running MS-DOS, Windows 3.1, Windows 95 or OS/2®. Providing you with complete management and reporting capabilities and supporting an array of hardware and operating systems including UNIX and OpenVMS, AssetWORKS brings you the full coverage you need in a multiplatform enterprise environment.

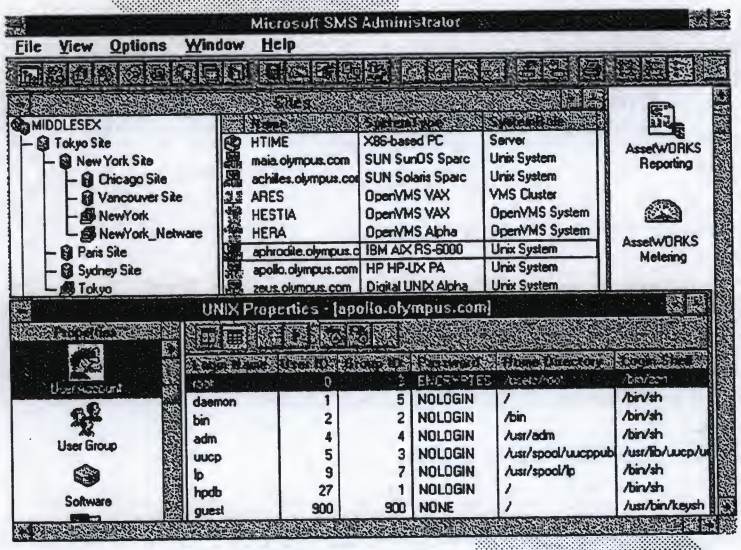
Streamline your software distribution across the enterprise

Software distribution across the enterprise has never been easier. With AssetWORKS, you simply drag and drop software packages onto your target systems.

For example, working at an SMS administrator console, you can drag and drop software packages to be installed on Digital UNIX, OpenVMS, Windows, and MS-DOS systems—as well as SunOS, Macintosh and many other platforms.



Use the SMS Administrator to define software packages that can be "dragged and dropped" onto UNIX and OpenVMS machines.



AssetWORKS extends SMS with support for industry leading UNIX and OpenVMS systems.

Integrated with NetView™ for Windows NT

Bringing additional efficiencies to your network management operations, AssetWORKS now enables you to access a variety of POLYCENTER Manager on NetView for Windows NT (PNV/NT) applications from within the SMS Administrator console. Available applications include Find Node, Node Properties, MIB Browse, IP Traffic and Interface Traffic.

A simple client/server solution

AssetWORKS has two main components in addition to the networked clients it serves: a site server and an administrator's console. The site server, based on Windows NT Server software, contains the configuration database and any software to be distributed. For load balancing and scalability, one or more helper servers, distribution servers, or database servers can also be used.

The administrator's console, based on Windows NT Workstation software, provides the graphical user interface to perform all management tasks. The administrator's console can run on the site server or on a separate station.

Planning for success

With AssetWORKS, upgrade planning is a straightforward task. You no longer need to ask, "What systems do I have and how are they deployed?" or "What software has changed and when did it change?" or "Who is using what software and when?" With AssetWORKS, you can quickly survey your system configuration data to determine what prerequisites are needed or what hardware updates required prior to a software upgrade.

All the information you need is stored in a common database that is automatically updated every time your hardware or software is upgraded. No more guesswork, no more confusion, no more relying on someone's hazy memory when valuable resources are at stake.

POLYCENTER AssetWORKS Product Capabilities

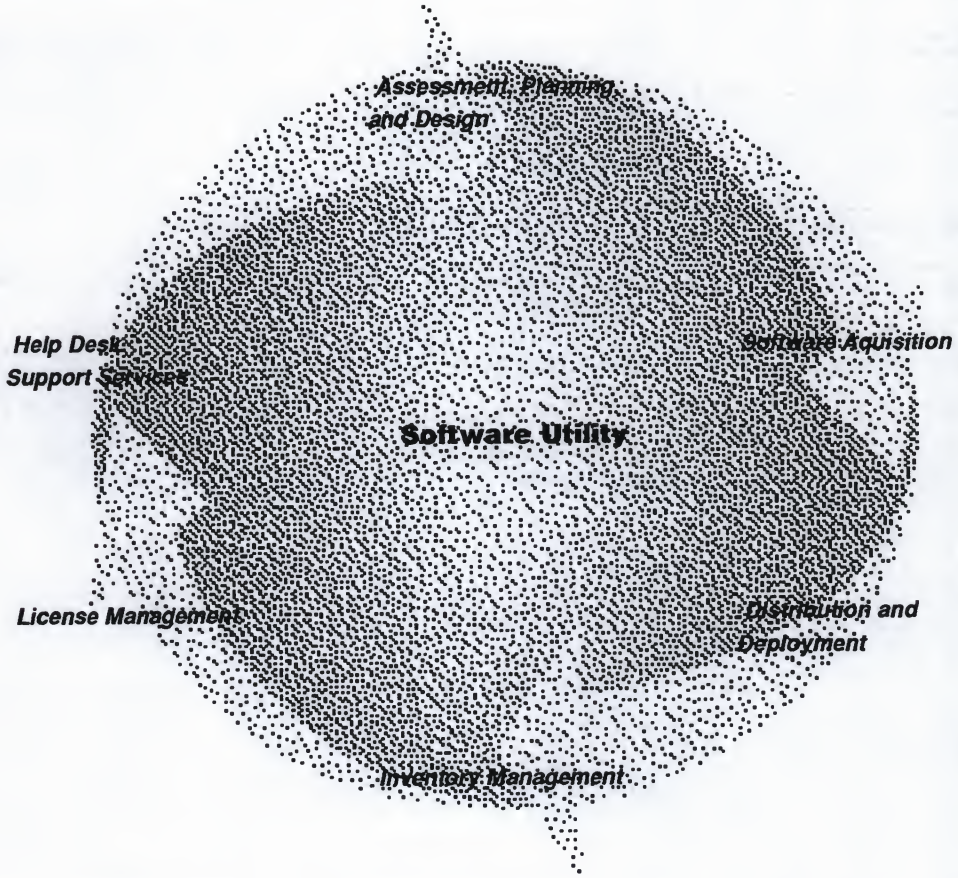
	Metering and auditing	Ad-hoc Graphical Reporting	Inventory	Software distribution	Remote control & diagonistics	Network application acces
MS-DOS	●	●	▲	▲	▲	
Windows	●	●	▲	▲	▲	▲
OS/2		●	▲	▲		
Macintosh	●	●	▲	▲		
Windows 95		●	▲	▲	▲	
Windows NT	●	●	▲	▲		▲
Windows for Workgroups	●	●	▲	▲	▲	▲
Digital UNIX		●	●	●		
ULTRIX		●	●	●		
OpenVMS		●	●	●		
HP-UX		●	●	●		
IBM AIX		●	●	●		
Sun Solaris		●	●	●		
SunOS		●	●	●		

POLYCENTER AssetWORKS ●

Microsoft Systems Management Server ▲

Digital's Software Utility

POLYCENTER AssetWORKS is part of Digital's Software Utility. The Software Utility provides the optimum management solution for your business needs, using integrated products and services to control costs throughout your environment and at every stage of the software lifecycle, from acquisition to support.



Asset Management
Digital's Software Utility offers a wide range of asset management services. You can choose the combination of products and services you need in order to design and implement the asset management solution that works best for you.

Specific services are available: Asset Management Consulting, Asset Management Design, Asset Management Implementation, Inventory Management and Software License Review.

Asset Management Consulting
We help you identify your business goals with respect to asset management, evaluate your current asset management practices, and design a new process that provides ongoing maintenance.

Asset Management Design
We help you design your SMS/AssetWORKS topology of site servers, logon servers, etc., to fit your specific needs and environment.

Asset Management Implementation
We install and configure SMS and AssetWORKS and provide orientation to ensure ongoing management of hardware and software assets.

Inventory Management
We develop a database providing you with an inventory of the hardware and software assets in your environment, as well as written reports to give you an accurate picture.

Software License Review
We document the number and type of all software licenses you have acquired, compare this to the actual number of installed software products in your environment, and work with you to plan actions and strategies to keep you in compliance.

Software Acquisition
As a core part of Digital's Software Utility, Software Acquisition allows managers of large distributed environments to purchase desktop software in volume and at a discount. Digital's capabilities include central distribution of software across international boundaries, taking into account all local value-added taxes, import duties, and other additional charges. No other vendor brings you this unique advantage.

Help Desk Support Services
With the Software Utility, you ensure optimum use of your software from day one with Help Desk User, Help Desk Pro or Help Desk Premium Support. You can choose to provide expert, responsive support directly to your end-users, or deliver support to your technical staff to supplement your in-house help desk capabilities.

POLYCENTER AssetWORKS System Requirements

	Primary Site Server	Secondary Site Server	Administrator's Console
CPU/System	80486-66, Alpha, Pentium®	80486-66, Alpha, Pentium	80486-33, Alpha, Pentium
RAM	32MB	24MB	16MB
File System	NTFS (on the SMS partition only)	NTFS (on the SMS partition only)	
Disk Space	100MB (A 50 MB paging file is required for installation)	100MB	2MB
Additional Hardware	Network card CD-ROM drive	Network card	Network card
Software	Systems Management Server (SMS) V1.1 Windows NT Server V3.5 (SP2) or V3.51 SQL Server for Windows NT V4.21A or V6.0	Systems Management Server(SMS) V1.1 Windows NT Server V3.5 (SP2) or V3.51	Windows NT V3.5 (SP2) or V3.51

For more information

To find out more about POLYCENTER AssetWORKS and Digital's Software Utility, contact your local Digital Multivendor Customer Services representative or authorized business partner, or visit Digital's Software Utility page on the World Wide Web at http://www.digital.com/info/mcs/tsu/tsu.html

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AssetWORKS PC Client system requirements

Windows, Windows for Workgroups and Windows NT
512 KB disk space
SMS Client V1.1
AssetWORKS PC Client V2.0

MS-DOS
512 KB disk space
TSR requires 4K of low memory
SMS Client V1.1
AssetWORKS PC Client V2.0

Macintosh
512 KB disk space
System 7 or higher
SMS Client V1.1
AssetWORKS PC Client V2.0

AssetWORKS Enterprise Client system requirements

IBM AIX
IBM RS6000 or higher
AIX V3.2 or greater
9MB disk space
AssetWORKS Enterprise Client V2.0

Sun Solaris SPARC processors
Solaris V2.3 or greater
9MB disk space
AssetWORKS Enterprise Client V2.0

HP-UX HP9000 series 700 or 800
HP-UX V9.0 or greater
9MB disk space
AssetWORKS Enterprise Client V2.0

SunOS SPARC processors
SunOS V4.1.2 or greater.
9 MB disk space
AssetWORKS Enterprise Client V2.0

ULTRIX RISC processors
ULTRIX Version 4.3 or greater
9 MB disk space
AssetWORKS Enterprise Client V2.0

Digital UNIX Alpha processors
Digital UNIX V2.0 or greater
9 MB disk space
AssetWORKS Enterprise Client V2.0

OpenVMS Alpha processors
OpenVMS Alpha V6.1 or greater
3,500 blocks disk space
AssetWORKS Enterprise Client V2.0

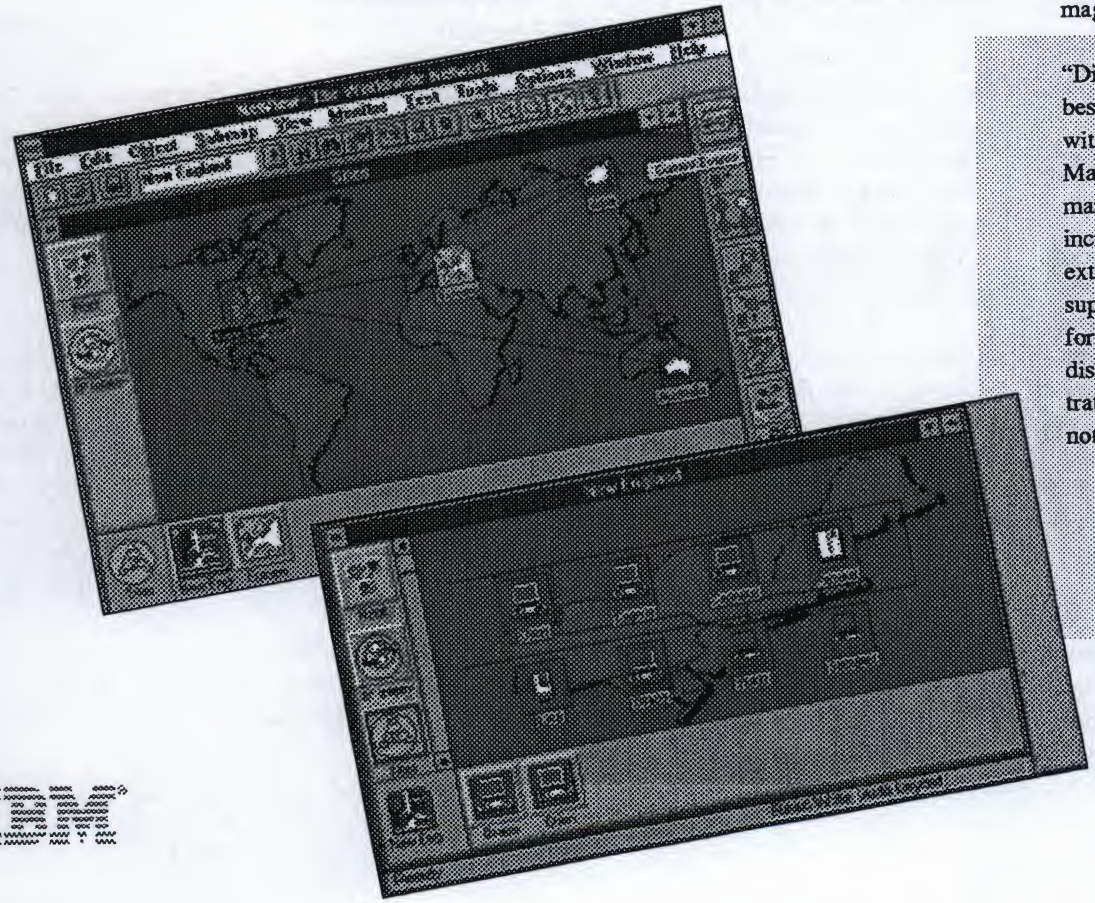
VAX processors
OpenVMS VAX Version 5.5-2 or greater
3,000 blocks disk space
AssetWORKS Enterprise Client V2.0

digital™

POLYCENTER Manager on NetView for Windows NT

The low-cost solution for managing your global network

For years, POLYCENTER Manager on NetView® for Digital UNIX® has provided SNMP management of multivendor enterprise networks, including configuration, fault, and performance management. Now these management capabilities are available on Windows NT™ with a new "third-generation" GUI that enhances the award-winning NetView interface with Windows™ 95 style conventions.



As your network grows in size and complexity, so does the cost of managing it. Now you can dramatically reduce this cost by managing your entire network from a low-cost, easy-to-use PC with POLYCENTER Manager on NetView for Windows NT.

Management analyst Jill Huntington-Lee echoed this sentiment in the June 1995 issue of *INTERNETWORK* magazine:

"Digital Equipment offers the best value for the money today with its new POLYCENTER Manager on NetView for NT™ management platform. It's incredibly easy to use and extend, amazingly fast, and supports lots of optional extras for router path tracing, software distribution, and LAN administration. And, no, Digital is not paying me to say that."

IBM®

POLYCENTER Manager on NetView for Windows NT — what's in a name?

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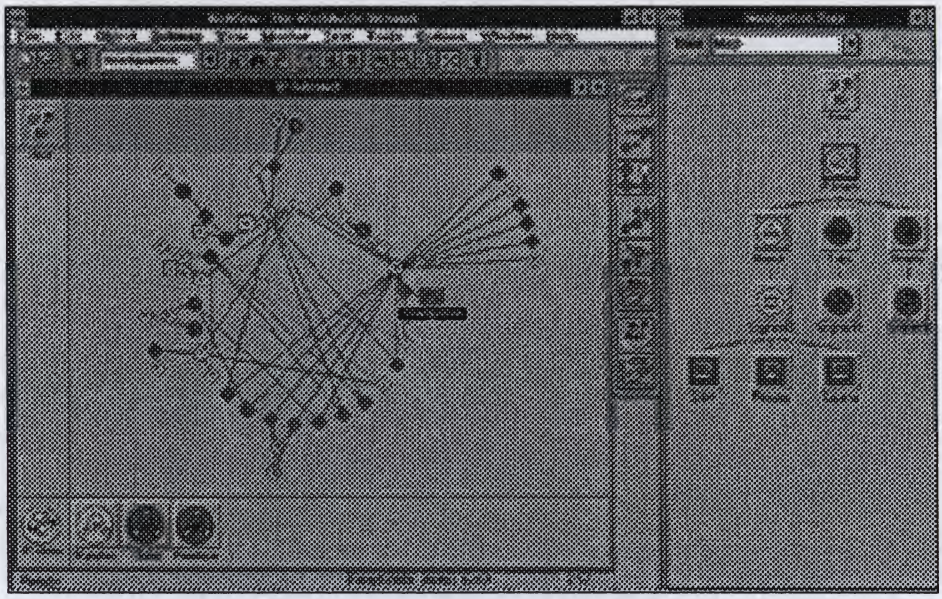
POLYCENTER — the comprehensive portfolio of network and system management solutions from Digital and our partners, providing management of distributed multivendor enterprise networks

•

NetView — the industrial-strength SNMP network manager co-developed in a historic collaboration between two of the pioneers of enterprise networks — Digital and IBM

•

Windows NT — the emerging enterprise management platform of the future, backed by two industry forces — Digital and Microsoft



Industrial-strength network management from your Windows NT PC

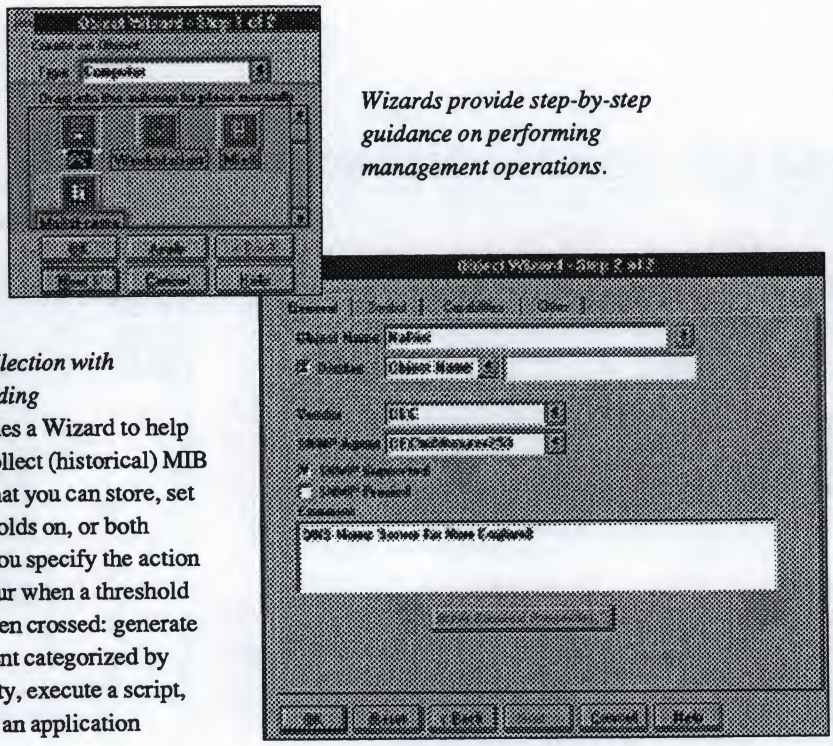
It's no secret that Windows NT is being adopted by more and more corporations and software development shops around the world. Windows NT is emerging as the common point of convergence, the "sweet spot," for enterprises at both ends of the management spectrum. Large enterprises downsizing from mainframes are attracted to the low-cost, yet powerful Windows NT platform. Smaller corporations upsizing from Windows™ DOS-based tools need the power of Windows NT to manage their growing LANs, campuses, and WANs. In addition, the familiar Windows graphical user interface (GUI) minimizes their training costs. Add clustering for scalability and reliability, and it's no wonder management application vendors are attracted to the vast sales opportunities presented by the growing Windows NT market.

Windows NT is a serious operating system that you can bet your business on, complete with a 32-bit virtual address space, protected memory, true multitasking, security, multiuser support, integrated networking, a fault-resistant file system, symmetric multiprocessing (SMP), and the widely accepted Windows GUI.

Until recently, network managers had to choose between the industrial-strength capabilities of UNIX-based network managers and the low cost and ease-of-use of PC-based managers. Now you can "have your cake and eat it too!"

With POLYCENTER Manager on NetView, you get the capabilities typically associated with UNIX-based SNMP managers on a low-cost NT PC. You are no longer limited to 16-bit DOS-based LAN managers. That's right, Digital's NT version of NetView is a port of the industrial-strength NetView code that runs on the Digital UNIX and IBM® AIX® operating systems. You get the same configuration, fault, and performance management that companies like Digital depend on to keep their enterprise networks up and running:

- *Auto-discovery and auto-topology*
 - Automatically discovers network objects; builds the network map and submaps
- *Automatic status polling*
 - Uses IP-Ping to automatically monitor the availability of network objects
- *Navigation Tree*
 - Ensures that you always know exactly where you are as you traverse the network
 - Functions as a radar system conveying the health of critical network submaps
 - Gives you fast point-and-click access to any submap



Wizards provide step-by-step guidance on performing management operations.

- *Dynamic events display via event cards and lists*
 - Keeps you abreast of what is happening in the network
 - Categorizes events by severity, making it easy to identify critical events that need immediate attention
 - Lets you toggle between an industry-standard event list or unique event cards that provide comprehensive trap information, quick access to MIB data, and the ability to enter notes regarding the event
- *Event filtering*
 - Makes it easy to filter out events, so you can focus on more pertinent information
- *MIB Loader*
 - Lets you point-and-click to hot load and unload MIBs
- *MIB Browser*
 - Lets you point-and-click to query devices for management information (MIB data)
 - Provides unique MIB definitions that make it significantly easier to learn MIBs and use them more effectively
- *MIB Tool Builder for custom queries*
 - Provides a Wizard to help you define simple (macro) applications that automatically retrieve and display MIB variables in your choice of a table, form, or graph
- *Data collection with thresholding*
 - Provides a Wizard to help you collect (historical) MIB data that you can store, set thresholds on, or both
 - Lets you specify the action to occur when a threshold has been crossed: generate an event categorized by severity, execute a script, or run an application
- *Network monitoring tools*
 - Includes diagnostic routines that help you monitor the health of your networks and quickly identify problems
- *Graphical data analysis*
 - Lets you visually analyze data including interface traffic, IP traffic, SNMP management traffic, and historical data
- *Application launch via simple registration files*
 - Lets you integrate other management applications with NetView using simple ASCII registration files
- *API support*
 - Includes industry-standard APIs that allow varying levels of integration of management applications with NetView

Now your interface to these capabilities has been made even easier by a powerful GUI based on the Windows 95 style guide.

Manage networks — not windows!

Digital believes that network managers should manage networks, not windows! That's why we took the award-winning NetView GUI and gave it the look-and-feel that dominates the computer industry — Windows! If you've used other Windows applications, the NetView interface will be like a familiar friend. In the words of management consultant John Powell:

> "They did an extremely good job with the interface. It shares the same command structure as Windows does, so it was immediately familiar to me."

Everything is where you would expect it. There are wizards, menus, dockable toolbars complete with tooltips, help functions, and mouse conventions — all working together to ease the task of managing your network. Tile your windows or cascade them — we've implemented numerous standard Windows conventions.

To ensure you get the most effective user interface possible, Digital also conducted usability testing of the NetView on NT product. We incorporated the feedback of front-line network managers who live the day-to-day challenges of managing enterprise networks. This extensive testing resulted in significant improvements to the NetView for Windows NT GUI. Several of the most frequently used management tasks were streamlined in direct response to input from users running early versions of the software.



For example, instead of manually searching through multiple submaps to find a particular object, you can use the QuickFind capability on the standard toolbar. Simply type a portion of the object's name in the space provided and NetView will give you a list of all submaps where the object can be found — double-click on the desired submap and NetView will display it with the object highlighted.

When you need to manage your network and don't have time to manage windows, POLYCENTER Manager on NetView makes it easy. Our aim is simple: minimize training costs, reduce operational costs, and keep your network up and running. We even make it easy to tie in critical systems management functions.

Integrate with ManageWORKS Workgroup Administrator

ManageWORKS provides a single consistent interface that simplifies management of multiple network operating systems, including PATHWORKS, NetWare®, and LAN Manager. It also includes some SNMP management capabilities. ManageWORKS can forward network status information and events to NetView. The integration of ManageWORKS with NetView provides local autonomy with centralized management. Management information and control can reside where it is most needed.

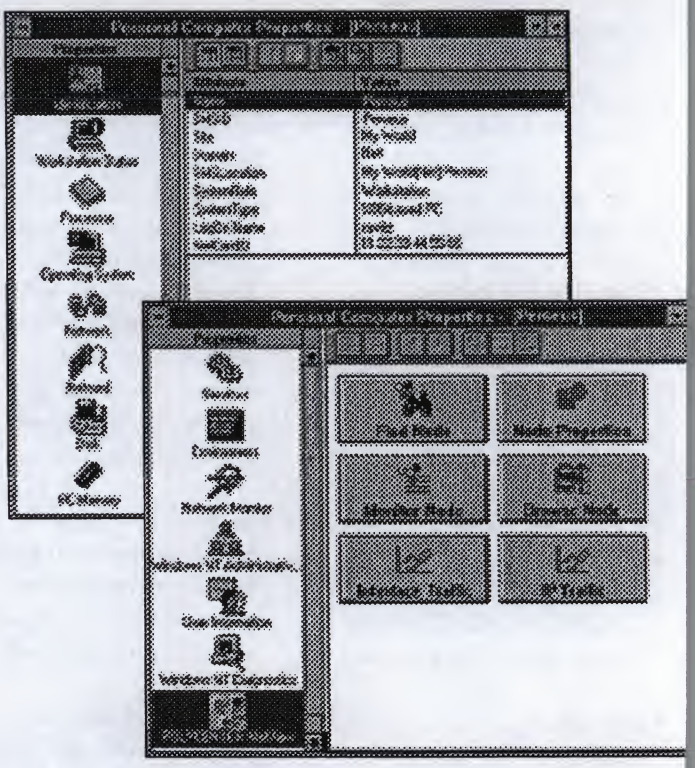
Extend your management capabilities with Asset Management from Digital and Microsoft

Today's management challenges go beyond network management of SNMP-based devices. Information technology departments need to perform systems management of a vast array of multivendor computers. NetView can tell you if a device is up, but how is it configured? How much memory and disk space does it have? What software applications is it running, and what versions are they? How often is a shared application being accessed by a particular user?

To empower you to answer these questions, we've provided bidirectional integration between POLYCENTER Manager on NetView for Windows NT and leading systems management applications like POLYCENTER AssetWORKS and Microsoft® Systems Management Server.

POLYCENTER AssetWORKS builds on Microsoft Systems Management Server, providing

From SMS, click on the NetView icon to perform six network management functions.



critical configuration management capabilities for multivendor computers, including MS-DOS®, Windows, Windows 95, Windows NT, OS/2®, Macintosh®, OpenVMS, Digital UNIX, SunOS®, AIX, Solaris®, HP-UX®, and ULTRIX RISC systems. Now from a central location, using a single database, you can automatically collect hardware and software configuration data, remotely distribute and install software applications and upgrades, meter and graphically report on application usage, and print management reports.

In addition to leadership applications like ManageWORKS Workgroup Administrator and POLYCENTER AssetWORKS, Digital has many other management applications coming soon to Windows NT. The integration of POLYCENTER Manager on NetView with these management tools gives you more complete informatio for better management decisio According to Larry Abbott, senior editor, *Managing Distributed Systems*:

"...the PNV [POLYCENTER Manager on NetView] /SMS/ AssetWORKS combination is a killer network/system management suite on NT."

Industry-standard APIs and integration mechanisms

If you're a vendor who has integrated your management application with one of the leading management platforms on UNIX, you'll be in business quickly on Windows NT!

POLYCENTER Manager on NetView for Windows NT offers the same application programming interfaces (APIs) and integration mechanisms as POLYCENTER Manager on NetView for Digital UNIX, NetView for AIX, and HP® OpenView for HP-UX. This continuing tradition of standard APIs means lots of management applications on Windows NT.

Choose from an extensive catalog of integrated applications

Jointly sponsored by Digital and IBM, the NetView Association assists vendors in developing management applications for the NetView environments. Since its founding in 1993, the NetView Association has grown to more than 250 members — a commitment that firmly establishes NetView as a major, long-term player in the enterprise network and system management market.

The list of vendors committed to porting their management applications to Windows NT continues to grow. For a current list, contact the NetView Association at the number below. Some of these vendors include:

4th Dimension Software, Inc.
Allen Systems Group, Inc.
American Computer and Electronics Corp.
Applied Expert Systems, Inc.
Automated Network Management, Inc.
BMC Software, Inc.
CACI Products Company
CI Technologies, Inc.
Clear Systems, Inc.
DataFocus, Inc.
Datametrics Systems Corp.
DeskTalk Systems, Inc.
Dialog Communications Systems
Diederich & Associates, Inc.
Frontier Software Development, Inc.
Frye Computer Systems, Inc.
Gensym Corp.
GTE Telephone
HAL Software Systems
Haystack Laboratories, Inc.
Heroix Corp.
Hummingbird Communications
Hypercom, Inc.
Innovative Software Development Co.
Ki Networks
Multihouse Networking
Network-1 Software, Inc.
Notification Technologies, Inc.
NuCom Systems, Inc.
PEER Networks, Inc.
Prolin Automation B.V.
RAXCO, Inc.
Redmond Technology Group, Inc.
River Run Software Group
SoftLink, Ltd.
Software Management Associates
StonyBrook Software
Systar
Systemetrics, Inc.
Target Systems, Inc.
Technically Elite Concepts, Inc.
Thurber Technology Group
Victron B.V.
XuiS Software

If your company is a member of the NetView Association from Digital and IBM, you can call upon the technical support services of the Association to help you in migrating your applications to Windows NT. Contact the NetView Association by phone at 603-881-0349 or send a fax to 603-881-0022.

Hardware and software requirements (Intel version)

- *Minimum*
 - Intel® 486, 66 MHz processor
 - Windows NT Workstation or Server V3.5 or V3.51
 - NTFS drive with at least 100 MB of available disk space
 - 120 MB paging space
 - 24 MB of RAM
 - Network adapter card
 - SVGA graphics card and monitor (minimum 800 3 600 pixels)
 - TCP/IP protocol installed and configured
 - You must be a member of the Administrators Group.

- *Recommended for large networks*
 - Intel Pentium® processor
 - SVGA graphics card and monitor (minimum 1024 × 768 pixels)
 - 32 to 64 MB of RAM
 - NTFS drive with at least 500 to 1,000 MB of available disk space

digital™

Ordering information

- *Licenses and kits*
 - QB-3LFAA-SA
 License, CD-ROM,
 User's Guide Package
 - QM-3LFAA-AA
 License Only
 - QA-3LFAA-GZ
 User's Guide
 Documentation-Only Kit
 - QA-3LFAB-GZ
 Developer's
 Documentation-Only Kit

- *Services*
 - QT-3LFAA-XA
 Package Product Service
 - QT-3LFAA-TA
 New Version License Service
 - QT-3LFAA-ZA
 Software Telephone Support

The first release of POLYCENTER Manager on NetView for Windows NT executes only on Intel machines. However, Digital plans to release support for the Alpha family of processors in the near future.

POLYCENTER online

To get the latest information on Digital's POLYCENTER products, visit our World Wide Web home page at:
http://www.digital.com/info/polycenter/
Or, in the U.S., call 1-800-DIGITAL.

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ServerWORKS Manager V2.0

Highlights

* **Comprehensive PC server and network management solution for AlphaServer and Digital Prioris systems**
* **Provides access to extensive server information, including CPU utilization, file system utilization, and network statistics**
* **Multiple platform management from one intuitive user interface -- Includes agents for Digital Prioris servers running NetWare, Windows NT, or SCO UNIX, and AlphaServer systems running the Windows NT, Digital UNIX, or OpenVMS operating systems**

Product description

ServerWORKS Manager V2.0 provides a comprehensive PC server and network management solution for AlphaServer systems and Digital Prioris PC servers. With ServerWORKS Manager V2.0, users can create topology maps of all SNMP network resources, monitor server information, set alarms and alerts to enable management of network resources, utilize Digital Clusters for Windows NT solutions, and launch third-party applications to support network management functions including backup and RAID storage.

System administrators can manage multiple platforms from one intuitive user interface. ServerWORKS Manager includes management agents for Prioris servers running NetWare, Windows NT, or SCO UNIX, as well as AlphaServer systems running Windows NT, Digital UNIX, or OpenVMS. The remote paging feature notifies system administrators of system alarms, even when they are away from their desk, office, or building.

Network administrators can use ServerWORKS Manager to access asset information from the manager's desktop when used in tandem with DMI-based ClientWORKS software. ServerWORKS Manager allows users to manage and alarm multiple network components utilizing a single interface. It integrates with Digital Clusters for Windows NT solutions, allowing file, print, and database services to maintain a high level of availability.

New features in ServerWORKS Manager V2.0 include

* Integration with ClientWORKS to obtain information on client desktops and laptops, as well as NT servers
* Integration of third-party applications, using the intelligent toolbar for easy access to information from other devices such as RAID controllers, backup software, and Remote Server Manager
* Enhanced support for Digital Prioris ZX Pentium Pro servers, including information on temperature and voltage, field replaceable units, ECC memory correction, and firmware
* Remote paging feature

Benefits

* Provides one interface to manage and set alarms on multiple network components, such as RAID, backup, and out-of-band servers
* Eases service and ensures high availability of enterprise resources with enhanced support for Prioris ZX Pentium Pro servers
* Notifies system administrators of system alarms, even when they are away from their desk, office, or building, with its remote paging system
* Maintains a high availability of file, print, and database services using Digital Clusters for Windows NT management features
* Uses Autodiscovery to build a topology map of all SNMP compatible devices -- Users get a bird's eye view of their networks without the time consuming task of manually entering IP addresses

Product positioning

ServerWORKS Manager comes bundled with every Digital Prioris server and AlphaServer system. It provides tools to help reduce the total cost of ownership of a network. As a standalone product, ServerWORKS Manager provides for management of the workgroup, including servers and other SNMP-compliant devices such as routers, hubs, and switches. ServerWORKS Manager can also be integrated with ClientWORKS software for management of desktops and laptops, and with enterprise managers such as Digital's POLYCENTER NetView. In addition, the ServerWORKS Manager intelligent toolbar makes it quick and easy to launch other management tools from one interface.

Availability and ordering

ServerWORKS Manager V2.0 is available now from Digital and its business partners. ServerWORKS Manager is shipped free of charge with every Prioris server and AlphaServer system.

Part number	Description
	ServerWORKS Manager V2.0
QB-4QYAA-SA	Aftermarket Kit
QB-4QXAA-MA	Upgrade Kit
	Services
QT-4QYAA-XA	ServerWORKS Packaged Service

Technical data

	Minimum requirements
Management console hardware	
- Processor	Intel 486DX2 66MHz
- Storage devices	Hard disk drive CD-ROM 3.5-inch floppy disk drive
- Storage device space	1 GB storage
- Network interface card	Network adapter with TCP/IP support (Ethernet and Token Ring)
- Monitor	SVGA 640x480 (1024x768 resolution recommended)
- Memory	32 MB (recommended)
Management console software	
- Station manager operating system	Recommended: - Windows NT 3.51 - Windows 95 Also supported: - Windows 3.1 - Windows for Workgroups 3.11
- Management console framework	ManageWORKS V2.2
- Transport protocol	SNMP ManageWORKS TCP/IP stack (or any other TCP/IP stack supported by ManageWORKS)
Server hardware	
- Digital Prioris servers	Prioris Intel family (LX, MTE, XL, HX, and ZX models)
- AlphaServer systems	400, 1000, 1000A, 2000, 2100, 2100A, 8200 (not NT), 8400 (not NT)
- Network interface card	Prioris Intel - TCP/IP adapter (Ethernet and Token Ring) AlphaServer - All network TCP/IP adapters
Server software	
- Network operating system	Digital UNIX V3.2D-1

	Novell NetWare V3.12 and V4.x SCO UNIX V5.0 Windows NT 3.51 (4.0 for Alpha) OS/2 V3.0 OpenVMS V6.2
- Network protocol	SNMP TCP/IP

*

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SCO is a registered trademark of the Santa Cruz Operation, Inc.
UNIX is a trademark in the United States and other countries, licensed exclusively through X/Open Company, Ltd.
Windows and Windows 95 are registered trademarks and Windows NT is a trademark of Microsoft Corporation.

Digital ClientWORKS

Contact:

Americas: Peter Basmajian (ClientWORKS Product Marketing), DTN 244-6889,
(508) 264-6889, AKO

Highlights

* **First 32-bit Desktop Management Interface (DMI) service layer for Windows 95 and Windows NT, as well as the existing 16-bit DMI service layer for Windows for Workgroups**
* **Digital is first to offer SNMP and DMI on the same management console**

Product description

Digital ClientWORKS is the family of client management and networking tools for Digital's Venturis and Celebris desktop personal computers. ClientWORKS extends Digital's current Desktop Management Interface (DMI) offering by providing an enhanced set of utilities and software to help network administrators get the most out of their networking environments.

Features

* First 32-bit DMI service layer for Windows 95 and Windows NT, as well as the existing 16-bit DMI service layer for Windows for Workgroups
* Enhanced system MIF file for industry-standard desktop management
* Enhanced ClientWORKS browser offers local and remote SMI component identification
* ClientWORKS Utility makes DMI data available to Microsoft Systems Management Server (SMS)
* SNMP agent software for powerful remote management in heterogeneous environments
* Support of ISE SMART disk drive technology for fault management on the desktop
* Enhanced diagnostics for system troubleshooting

Digital is a founding member of the Desktop Management Task Force (DMTF), and has been actively involved in defining the DMI specifications since 1992.

Benefits

The combination of the ServerWORKS Manager and ClientWORKS provides a comprehensive solution that no other PC company can provide.

* Powerful network and desktop management -- Since ServerWORKS Manager includes the ManageWORKS Workgroup Administrator and provides integration to enterprise management tools. SNMP and DMI support enables users to manage desktop PCs with the highest levels of information.
* Bringing DMI to Windows NT server environments -- Network administrators can view DMI information from within Microsoft SMS and POLYCENTER AssetWORKS environments, perform SQL database searches information throughout the enterprise, query PC models and available SIMM slots in remote machines, and use the information to upgrade all equipment directly from the desktop.
* DMI-enabled asset management and SNMP-based fault management -- First vendor to offer SNMP and DMI on the same management console, providing users with the ability to manage multiple NOS environments, gain an SNMP-based view of all network components, and view detailed desktop information via DMI. From within ServerWORKS Manager, network administrators click on a desktop icon and seamlessly launch the ClientWORKS browser to display the highest levels of information.
* Powerful, standards-based workgroup/LAN management scalable to the enterprise -- Easily communicates and integrates with POLYCENTER NetView, HP OpenView UX, IBM NetView/6000

AIX, and other enterprise-level management tools. This capability permits easier integration and better system and network management than other management offerings. Network administrators gain the growth path they need to connect their PC LANs to the enterprise framework at no additional cost.

Availability and ordering

Digital ClientWORKS is provided free-of-charge on Digital desktop PCs.

Resources

Internal

* Desktop Management Interface data sheet -- EC-F5443-88

External

* Internet information --http://www.pc.digital.com

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digital

AltaVista Software

White paper: Real solutions for the virtual enterprise



Real solutions for the virtual enterprise

The drive to achieve business success in the face of increasing global competition has led to profound organizational changes throughout the corporate world. Distributed, mobile enterprises are reaching out to get closer to the customer, tap remote resources, and integrate value from third parties. The fixed organizational structure is largely disappearing and workers are staking a claim in the virtual world — where the landscape is constantly changing.

The role of technology in this dynamic environment is to assist the business worker in staying productive. This means gaining immediate access to precise information. It means easily communicating and collaborating with team members. This means leveling differences in everything from computing platforms to time zones.

The Internet holds the key to success for today's virtual organizations. As a public infrastructure, the Internet is accessible by anyone with a PC and a modem — it's a global backbone that can link branches, telecommuters, partners, suppliers, or customers into your business processes.

Its basic technologies — web servers, web browsers, and TCP/IP networks— also make the Internet very appealing as an infrastructure for corporations. Creating a secure intranet — a private network that uses Internet technologies inside the enterprise — is easy and cost-effective to implement and manage, cuts across disparate information systems, and is platform independent. Moreover, anyone on your intranet can gain seamless access to the Internet and, within secure limits, vice versa. It is the ideal infrastructure, connecting all the possible resources that add value to your business. But what of the specific tools that help the Internet or intranet user with the daily tasks of doing work?

The answer is AltaVista Software from Digital. Based on standard Internet technologies, AltaVista Software meets the key connectivity requirements of everyone in your virtual organization — whether they're on the Internet or your intranet:

Access to all information within the enterprise and across the Internet

•

Flexibility to support a mobile workforce

•

Integration of partners and suppliers to create a virtual organization

•

Ability to create new distribution channels direct to customers.

With AltaVista Software, you can achieve seamless connectivity among all the information, people, and resources that contribute value to your business. The key is a combination of standard Internet technologies and advanced software built on those technologies that let you exploit the vast resources of the Internet, as well as your own legacy information assets. Information, communication, collaboration — all in a secure, global environment. This is both the vision and reality of Digital's AltaVista Software.

Pioneering the way to the virtual world

Where did AltaVista Software come from? The rise of the Internet in recent years has been driven by user need, with the roots of this need going back nearly 20 years. AltaVista Software is derived from Digital's pioneering work throughout this long history, and reflects an understanding of both the technology and its practical applications.

The origins of the Internet — a brief look back

The Internet was originally a research network created by the U.S. Defense Department called ARPAnet. ARPAnet was designed to be "bomb proof;" that is, if any section of the network were ever to go down for any reason, the rest of it could still function. It was, essentially, a network of computers where each computer was connected to the other with no single point of failure. The protocol used for ARPAnet — the Internet Protocol (IP) — was simple and allowed any computer on the network to talk on a peer-to-peer basis with any other computer. The Internet Protocol was a practical method for communication among computers from a variety of manufacturers, and it quickly became very popular with the government and universities.

Most significant about the early Internet, it was always available (the Department of Defense had seen to that) and it permitted anyone with IP software to get onto it — regardless of their computing platform. It had all the makings of an ideal infrastructure. The only catch was that the methods used for communicating and accessing information were arcane, which limited the Internet's practical application in business. Yet, the number of nodes continued to grow.

Corporations soon saw value in providing access to the Internet from their own private networks. By adding gateways between their corporate networks and the Internet, employees had an easy way to exchange electronic mail with anyone else on the Internet. These gateways also provided access to growing databases of information on the Internet's host computers — most of which were at universities. These data repositories were an excellent resource for conducting research on anything from the flow of glaciers to the flow of semiconductors. If you knew a node's address, you could use a remote log-in application called "telnet" to explore the public portion of a host computer. This took some know-how. You could also download software a files from available directories, using the File Transfer Protocol (FTP) — yet, knowing where to look remained a serious impediment.

Eventually, indexes of this information were compiled and tools created, making it a bit easier to find needed information. Some of the first were "Archie," "WAIS," and "Gopher," which provided simple menu interfaces for exploring the Internet. Once you got to a site of interest, however, you might very well end up looking at a system prompt from some far-away host without knowing what to do.

Another Internet information service to emerge was the World Wide Web, developed at CERN, the European Particle Physics Laboratory. The web was based on a technology called "hypertext," linking related information from one host to another. Through the web, it now became possible to begin a research path and follow leads linked by hypertext without the need to identify a host and initiate a separate login. The "pages" listed on the web used the language called the HyperText Markup Language (HTML), which presents information in a visually appealing manner and supports graphics. "Browsers" — initially a simple character-based browser — made it relatively easy to explore the web. The development of graphical web browsers, such as Mosaic and Netscape, marked the turning point for the commercial viability of the Internet and its World Wide Web.

Graphical browsers made it possible for almost anyone to explore the Internet. Most browsers could be retrieved for free from the Internet itself, so it didn't take long for the idea to catch on. This virtual world quickly began to bustle with activity — communication soon expanded to include commerce. Businesses recognized a viable, new promotion and sales channel. Technology providers recognized an exciting new medium upon which to build new business tools.

Digital and the Internet — a living tradition

It is no surprise that Digital is at the forefront of the current wave of Internet solutions. We have been involved with the Internet since it was born as ARPAnet nearly 20 years ago — Digital's Marlborough facility hosted the first corporate site on ARPAnet in 1977. And, in 1985, we were first computer company to register an Internet domain — dec.com — as well as create a mail gateway so our employees could communicate over the Internet. As a result, Internet use — along with a broad range of Internet technology expertise — grew rapidly inside the company.

With our growing knowledge and experience, Digital began developing Internet services to support the business needs of ou customers. Public newsgroups for customer support, FTP access to software updates and patches, and the world's first Internet-based customer newsletter were all launched by the early 1990s Our internal projects were complemented by leadership involvement in the burgeoning Internet industry as a whole.

Digital is an original sponsor of CommerceNet, a consortium of companies and organizations formed to facilitate the use of an Internet-based infrastructure for electronic commerce. We are also a founding member of the World Wide Web Consortium (W3C), which develops common standards for the evolution of the World Wide Web. And Digital is an organization member of the Internet Society — the non-governmental international organization for global cooperation and coordination for the Internet and its technologies and applications.

Our leadership position has led to numerous ground-breaking achievements.

As early as 1994, Digital made the city of Palo Alto, California the first city in "cyberspace." And in that same year, we pioneered on-line Internet catalog-ordering for the Future Fantasy book store in Palo Alto, helping to turn a local merchant into a global competitor in the science fiction book market.

Digital, in partnership with the State of California, developed the largest ever single event at the time (1994) — the California Election Web server. This first-of-its-kind server demonstrated how in-depth graphical election results could be delivered worldwide in real-time. This pilot demonstrated a new, hybrid form of media that combines the depth and detail of newspaper with the immediacy of television.

In 1996, we one-upped this achievement with a joint venture with the Washington Post, ABC News, and Newsweek — the ElectionLine Web site. ElectionLine covers daily campaign events, provides information on candidates and issues, offers commentary and analysis, and will deliver real-time coverage o election results for the 1996 presidential elections. The site also includes interactive forums for the public to discuss issues and exchange personal views.

From hosting a first-of-its-kind video conference over the Internet between White House officials and high-ranking officials of the Russian government, to helping a small-town New Hampshire newspaper increase readership among young people through an interactive web site, Digital has led the way to real-world Internet solutions. No wonder Digital was chosen as the partner for the three most prestigious sites on the World Wide Web: the White House, the Vatican, and No. 10 Downing Stree

We have fostered innovative work in our renowned research laboratories. We have encouraged and supported the use of Internet technologies all across our own global intranet — the largest corporate intranet in the world. And Digital has directly helped customers with practical business solutions using the Internet. Who better, then, to deliver the world's most sophisticated Internet software products. No other company in the industry can boast of our level of experience and technological capabilities. And it is all driven by a clear business focus — Digital's AltaVista Software is dedicated to delivering a complete portfolio of industry-leading software to unlock the full potential of the Internet and intranets.

AltaVista Software is a natural development, from a company that has unparalleled Internet experience and has been integrally involved in the Internet from its infancy.

AltaVista Software — getting down to business

The needs of business today are straightforward. You need immediate access to customers, partners, and critical information. Finding and capitalizing-on new business opportunities worldwide is the key to out-flanking the competition. And reduced costs and cycle times are essential for long term profitability.

With our industry-leading technology and expertise, Digital is helping businesses exploit the value of the Internet to meet these needs — to achieve success on a global scale. AltaVista Software delivers powerful, meaningful capabilities that you can put to work right away, reaping the rewards long promised by the Internet. Here, you will find the world's most compelling portfolio of Internet and intranet software, designed so you can gain a real advantage in the virtual world by:

- Quickly finding useful information — including legacy data
- Easily communicating and collaborating with distributed teams over a secure virtual network
- Transparently managing the remote computing environment

Digital recognizes the Internet as the new connectivity paradigm to achieve these capabilities. Internet technology offers a simple architecture and platform-independence, which are the ideal building blocks for a mobile, virtual enterprise. What better way to quickly, easily, and cost-effectively integrate a disparate variety of business contributors?

Our experience and technical leadership have already produced one of the most profound business tools on the Internet today. Our AltaVista Search Service stands as a showcase for Digital's leadership in Internet technology — opening up the entire World Wide Web as a global information resource.

"I've used AltaVista quite a bit since it was unveiled . . . and I've been very impressed with the results. it's this kind of comprehensive search capability that promises to make the Internet really useful for many people."

- Ft. Lauderdale Sun-Sentinel

From this focal point, we will also share with the world our breakthrough AltaVista Software, which will be available for downloading from the AltaVista Software web site. The growing portfolio of AltaVista Software is tailored for commercial applications, to help you unlock the true potential of your intranet and the Internet.

AltaVista Software Portfolio

AltaVista Software provides your business workers with a higher view from which to discover, share, and add value to information and business processes in the virtual world. Using Internet technology as a common, ubiquitous environment, this growing family of products combines the vast resources of the Internet, the navigational ease of standard web browsers, and the value of your existing corporate data assets and network infrastructures. The result is the most sophisticated and powerful business tools available to enhance connectivity, improve communications and collaboration, accelerate access to information — all within a secure, manageable environment and availible on common computer platforms including Windows NT and UNIX.

With AltaVista Software, you get the global, dynamic capabilities you need for gaining a real competitive advantage in the virtual world.

AltaVista Search: Personal, Team, & Enterprise Editions

AltaVista Search products will bring the search and retrieval technology of our award-winning AltaVista Search Service to individual, workgroup, and enterprise applications. This powerful technology will be specially adapted to search your desktop, file servers, or your entire enterprise-wide intranet to instantly locate useful information wherever it may reside. Initially indexing HTML documents, AltaVista Search will support a wide range of data types and document formats in your enterprise — enabling you to search across every word on any document to find the precise information you need. There is no easier, faster, or more effective way to unlock hidden information assets and to maximize their value for your competitive advantage

AltaVista Forum

AltaVista Forum extends the reach of your existing network, allowing secure file sharing and real-time electronic conferencing across the Internet. This easy-to-use, affordable collaboration solution is the key to enhancing customer and supplier relationships, allowing formal and ad hoc virtual teams to work together across your private intranet and the public Internet seamlessly. Using non-proprietary Internet technology, AltaVista Forum enables users to share files, participate in on-line, real-time conferencing, or search for useful information — all through the convenience and ease of a standard web browser. It is the ideal way to ensure a tight, secure work environment that

spans multiple locations and a variety of computing platforms. For commercial-strength workgroup collaboration and electronic conferencing — without the high cost and complexity of a proprietary solution — AltaVista Forum is the choice.

AltaVista LAN Browser
AltaVista LAN Browser delivers the benefits of team collaboration on your workgroup LAN — without the high cost, time, and learning curve of proprietary groupware. With the AltaVista LAN Browser, you can use any standard web browser to quickly locate files anywhere on the shared directories of your network — no need to specify complicated paths. Through this simple, folder-based file system, you simply enter a few key words, and AltaVista LAN Browser's sophisticated indexing utility will point you to appropriate folders in seconds. Best of all, you can do it all with your existing network operating systems and network infrastructure.

AltaVista Mail
AltaVista Mail lets you use any standard POP3 mail clients (i.e. Microsoft Exchange, Netscape, Eudora, cc:Mail) or SMTP servers for simple, reliable, secure, and very low-cost electronic mail using the Internet standard SMPT protocol. And you can easily exchange a range of multimedia documents, including word documents, spreadsheets, audio, and video. Easy to set up and use, AltaVista Mail is the smart way to connect your entire virtual world of distributed staff, consultants, partners, suppliers, customers, and others. Based on standard Internet technology, AltaVista Mail provides a simple, ubiquitous mail environment that lets you communicate and exchange files across your private intranet or the public Internet. Since it uses the same standard simple mail transfer protocol (SMTP) network inside and outside your organization, AltaVista Mail is also simpler and less costly to manage than proprietary solutions.

AltaVista Firewall
AltaVista Firewall eliminates the risk of exposing your proprietary corporate data to competitors, hackers, or other unwanted intruders. AltaVista Firewall software creates a security partition between your intranet and the Internet. It allows you to provide your employees with broad access to Internet services, such as electronic mail, file transfer, Telnet, news services, and the World Wide Web. AltaVista Firewall opens up the full potential of the Internet with the security you need to run your business in the virtual world.

AltaVista Tunnel
AltaVista Tunnel provides low-cost Internet connectivity to securely integrate cyberworkers (any remote user connected to the Internet), partners, customers, and consultants with your business processes. Using advanced authentication and encryption technologies, AltaVista Tunnel creates a virtual private network between two firewall-protected LANs or between individual remote PC users and your secure intranet. The "tunnel" allows information to be securely passed through your firewall, onto the Internet, and transmitted to groups or remote individuals behind another firewall. In this way, you use the public infrastructure of the Internet as an extension of your own network without the high cost of leased lines. The Personal Edition is ideal for individuals connecting through an Internet Service Provider, while The Workgroup Edition supports continuous secure Internet connectivity among teams, branch offices, or entire organizations.

AltaVista Manager
AltaVista Manager provides management of all the software and web services across your virtual enterprise. The AltaVista Manager for BackOffice works with Microsoft's Systems Management Server (SMS) to provide comprehensive configuration management. This powerful combination gives you insight into the software being used on your intranet, including where it is used and when. It is the ideal tool to manage resource utilization, reduce software lifecycle costs, improve inventory management, and develop more efficient upgrade plans. AltaVista Remote Manager gives you real-time management control of your personal computers, web browsers, and web servers. You get a clear and concise view of your web assets for monitoring and troubleshooting from any location, ensuring the security and availability of these vital services. Th scalable software expands with your needs and is customizable to suit your specific intranet environment.

AltaVista Solution Suites
Digital understands that many business needs in the virtual world must be considered from a comprehensive viewpoint. That's why we are developing a family of AltaVista solutions – each a suite of selected AltaVista Software designed with your business needs in mind.

AltaVista Intranet Solution
The AltaVista Intranet Solution suite will enhance productivity across your Intranet, ensuring quick access to needed information wherever it is located. AltaVista Intranet Solution also will facilitate collaboration and communication among formal and ad hoc virtual teams to optimize resources and improve comm nications for everyone in your enterprise. This is the ideal way to improve the value of your intranet, with cost-effective, standards-based software that works with your existing systems an network infrastructure.

AltaVista Cyberworker Solution
The AltaVista Cyberworker Solution suite will connect all you remote workers and branch offices to the corporate intranet, extending the reach of your current network. Here's the solutic that will tightly integrate your entire virtual enterprise — including partners, suppliers, customers, and consultants — using a secure, reliable Internet-based infrastructure. AltaVista Cyberworker Solution is a complete package that will let you exploit the full potential of your intranet and the Internet.

Conclusion

Changing business needs and emerging Internet technologies. Digital's AltaVista Software has grown out of a corporate environment that understands and has experienced both.

Digital has more practical Internet experience than any other technology company. We pioneered using the Internet for business applications, and we're leading the industry in support of the most sophisticated and prestigious Internet sites around the world. Today, as the Internet has grown and businesses have evolved, Digital's AltaVista Software products and solutions are demonstrating the value of our experience and technological leadership.

Through research, innovation, and unequaled Internet experience, Digital has amassed the world's most powerful and sophisticated array of Internet technologies. Through practical application of these technologies — in the real world, in support of specific customer needs — the AltaVista Software family has emerged. Today, regardless of size or structure, businesses can use AltaVista Software to gain real competitive advantage in a dynamic, global economy. AltaVista Software holds the key to gaining immediate access to customers, partners, and critical information. It provides the tools for finding and capitalizing on new business opportunities worldwide. And it is designed using technology that helps you reduce costs and cycle times across your extended enterprise.

Using the Internet as the ubiquitous work environment of choice, AltaVista Software gives you a unique business advantage, providing the flexibility to compete and grow even in the face of a continually changing competitive landscape. AltaVista Software — real solutions for doing business in the virtual world.

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AltaVista Mail V1.0 for Windows NT

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Highlights

* **Low cost, simple server for Internet and intranet messaging**
* **Supports popular Internet POP3 messaging clients**
* **Requires no special expertise to install and administer**

Product description

AltaVista Mail for Windows NT V1.0 is a simple, low cost messaging server that supports Internet client and network protocols. Any POP3 (Post Office Protocol 3) client, such as Eudora from QUALCOMM Inc., Netscape Navigator V2.0, or the Microsoft Exchange client included with Windows 95, can connect to the server. AltaVista mail connects to other servers in the messaging network using SMTP (Simple Mail Transfer Protocol) and MIME (Multi-purpose Internet Mail Extensions). These connections may be permanent or dial-up.

For organizations that have embraced the concept of intranets (internal networks employing Internet technology), AltaVista Mail offers a robust, reliable, and scalable way of providing messaging services without requiring additional technical expertise from the user who administers the server. Scalable to support from 1 to 1,000 users, AltaVista Mail provides extremely cost-effective messaging services -- at less than the cost of two U.S. first-class postage stamps per user for 1,000 users.

AltaVista Mail integrates seamlessly with enterprise mail systems such as Microsoft Exchange. Both AltaVista Mail and the Internet Connector for Microsoft Exchange incorporate support for SMTP and MIME. Message content information is preserved so users of both AltaVista Mail and Microsoft Exchange can click-launch applications for handling message attachments. Digital and its partners provide gateways and connectors to enable the same interoperability between AltaVista Mail and Digital's ALL-IN-1 and MAILworks products. Lotus Notes can be connected in a similar manner.

The POP3 protocol model provides a mailbox on the server from which the user retrieves new mail. There are no file cabinet or printing services associated with POP3, which are considered client functions. A simple text-based applications programming interface (API) is provided with the server. This API allows development of mail-enabled applications that need to send and receive SMTP messages. AltaVista Mail can function as an SMTP router if it has access to a Domain Name Service (DNS).

AltaVista Mail can be administered either locally or remotely using a Windows 95 client or a Web browser. There are only seven administration tasks, since the server is self checking and repairing. The administration protocol is documented so an independent software vendor (ISV) or other developer can access the management functions and information provided by AltaVista Mail.

Benefits

* Highly reliable -- No expensive support staff is required
* Simple administration -- No expensive support staff is required
* No routine maintenance tasks - Provides low cost of ownership
* Scalable (1 to 1,000 users) -- Delivers a very low cost per user
* Based on Internet standards -- Ensures easy integration with other vendors' products

Competitive analysis

The lack of a native mail system in the Windows NT operating system has provided an opportunity for several start-up companies to provide products similar to AltaVista Mail. A feature by feature comparison of the servers reveals minor functional differences between vendors' products of which the most significant are shown below. The major Digital advantages over these products are the high reliability and extreme simplicity of AltaVista Mail, having been developed by a vendor with 15 years' experience in messaging systems.

Company/product	IMAP4 support	Management interface	Price
Digital AltaVista Mail	Planned	Windows 95 client or Web browser	$ 495
Netscape Communications Corporation Netscape Mail Server	Yes	Web browser	995
Software.Com Post.Office	No	Web browser	495
Internet Shopper Limited NT Mail	No	Web browser	500

Selling information

The target customers for AltaVista Mail are small and medium sized organizations that have no established messaging system. These organizations want to connect to the Internet but don't want to employ expert staff to do so. Remote "home-alone" workers, "road warriors," and small branch offices of larger organizations could also benefit from this system. Internet Service Providers will be attracted to the product's high reliability characteristics.

AltaVista Mail provides native messaging services for Internet and intranet environments. AltaVista Mail does not include file cabinet services, calendar, time management, workflow, or other groupware applications. For users who need these applications, Digital's ALL-IN-1 or MAILworks offerings, or Microsoft's Microsoft Exchange product, are appropriate (the decision also depends on the organization's operating system preferences). These more complex products can connect to AltaVista Mail through SMTP gateways and connectors.

Availability and ordering

AltaVista Mail will be available June 3, 1996, from Digital and its business partners. This product will be distributed on CD-ROM.

Order No.	Description	U.S. List
QM-505AA-AA	AltaVista Mail Server for Windows NT .License Only	$495
QB-505AA-SA	AltaVista Mail Server for Windows NT License and CD-ROM Package	520

Technical data

Supported clients

Any desktop client that supports the POP3 protocol, including

* Eudora from QUALCOMM Inc.
* Netscape Navigator V2.0 mail client
* Microsoft Windows 95 client with Microsoft Internet Explorer or Microsoft Plus! software
* Connectsoft E-Mail connection
* Next release (V2.7) of Digital's TeamLinks client

Minimum hardware configuration

* Intel or Alpha system running Microsoft Windows NT V3.51
* 16 MB main memory and 5MB disk space
* TCP/IP software for Windows NT

Resources

External

* Digital's Internet Software Business Unit (ISBU) home page -- http://altavista.software.digital.com

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Lotus Notes is a registered trademark of Lotus Development Corporation.



Overview of OLE Integration

(Formerly the Common Object Model)

Shawn Woods and John Parodi

August 1995

Digital Equipment Corporation

Introduction

OLE Integration is a joint undertaking of Digital Equipment Corporation and Microsoft Corporation, which was announced as the "Common Object Model" in November of 1993. COM -- recently renamed "OLE Integration by Microsoft and Digital -- is an open specification for system-level object-enabling technology. It builds on Microsoft's work in defining the component object model for construction of compound documents, and on Digital's experience in delivering its CORBA-compliant ObjectBroker™ product across a wide variety of server platforms.

OLE Integration is, in essence, the components of OLE that can be distributed across a computer network. OLE Integration will be delivered by Digital in future versions of ObjectBroker, and by Microsoft in future versions of Windows95™ and Windows NT™, making it a strategic technology for object integration from the desktop to servers.

The term "OLE Integration" encompasses a number of different things. First, OLE Integration contains the Component Object Model. An object model defines the rules for objects, how they interact with one another, and (optionally) how they are constructed. OLE Integration's Component Object Model defines these rules for OLE compliant objects.

Second, OLE Integration is a set of software product soon to be implemented and delivered by both Microsoft and Digital. Microsoft's OLE Integration product is packaged within OLE V2 in Microsoft's Windows™ and Windows NT™ operating systems. Digital will provide OLE Integration in ObjectBroker products on a wide variety of non-Microsoft platforms, including various UNIX systems. By conforming to the Component Object Model specification, separately developed and maintained application components can operate together correctly. OLE Integration is being defined to provide full compatibility with OLE V2, thus these application components may be existing shrink-wrapped OLE applications or custom OLE applications.

Third, OLE Integration embodies a particular style of object technology -- one that emphasizes runtime binding and negotiation between objects (in order to agree on an interface both are capable of using). Finally, OLE Integration includes a distributed object wire protocol based on the DCE RPC standard with some extensions.

OLE Integration is not an object development environment *per se*, but can be supported by multiple object development environments. The most important aspect of OLE Integration is that it provides an environment for objects to interact, quickly and flexibly, in various languages, and among different machines. OLE Integration's Component Object Model specifies the binary form of objects and fast, in-process integration between objects, regardless of the language in which they were implemented. Thus OLE Integration provides a flexible way to deploy classes and objects by way of mechanisms that can recognize and manage new versions of object APIs and implementations.

OLE Integration Background

Microsoft uses the Component Object Model as the basic object oriented technology underlying the OLE compound document system. OLE Integration's Component Object Model first appeared as a part of OLE 2.0 and is being used today by all Windows applications that support OLE 2.0 functions such as drag-and-drop or in-place editing.

The wider scope of OLE Integration will be used in two new areas. First, Microsoft is providing many new operating system APIs as OLE Integration object interfaces (e.g., in Windows 95™ and future versions of Windows NT). Clearly, OLE Integration is a strategic operating system technology for Microsoft.

Second, Digital is implementing OLE Integration on Digital UNIX, OpenVMS and on UNIX platforms from other vendors. OLE Integration is identical on all these platforms, which makes it particularly suitable as a distributed object technology. OLE Integration provides a single, flexible object model, object environment, and object communication mechanism among the industry-standard server platforms and the *de facto* industry-standard desktop. The tight affinity between OLE Integration and the many Windows/OLE applications underscores OLE Integration's importance to Digital's customers, and therefore OLE Integration's strategic importance to Digital.

Many of OLE Integration's benefits are derived from the technology requirements of a loosely-coupled desktop environment, such as OLE. The first requirement is binary encapsulation between objects since servers/objects need to be connected at runtime without regard for how (or with what language) they were written. The second requirement is "in-process" performance when these heterogeneous objects to talk to one another. OLE Integration meets both of these requirements through its binary standard, a simple yet elegant method invocation mechanism based on the local platform procedure calling standard.

The third requirement is a very flexible "mix and match" environment, capable of integrating an evolving set of software components from various vendors and sources. OLE Integration meets this requirement by supporting binary deployment of classes and objects, by supporting versioning of object interfaces, and by providing a flexible style of late object binding. Using OLE Integration, two objects can negotiate what versions of interfaces they will use to communicate.

The fourth requirement is object distribution, first between multiple processes on a single machine and later with remote processes. OLE Integration is inherently designed to be distributable and supports remote objects transparently.

Fulfilling these requirements brings significant benefits to those who use software systems:

- To the end user, OLE Integration provides direct access to information across the enterprise from shrink-wrapped applications on the desktop.

- To the Independent Software Vendor, OLE Integration provides the ability to build applications using modular components, and to construct such "componentware" for resale.

- To corporate software development teams, OLE Integration provides a rich infrastructure that lends itself to the construction of new distributed applications and the evolution of existing applications to the client/server model.

The Structure of OLE Integration

There are a number of different parts to OLE Integration:

- OLE Integration Interface Model. The essence of OLE Integration, this specifies: how an object's behaviors are defined and accessed, how objects are created, object lifecycle management, and the binary encapsulation between objects.

- OLE Integration Distribution Subsystem. The model and code that transparently connects remote objects, this subsystem includes a OLE Integration-specific wire protocol based on DCE RPC, a system to find and launch servers, and namespace capability to locate classes and individual objects.

- Compound Files. A layered set of classes that provide a sophisticated hierarchical storage structure within a single file, compound files can integrate object data from any implementation of a OLE Integration object.

- Uniform Data Transfer. A way to pass data between cooperating objects and applications

- Automation. A mechanism that lets you determine an object's capabilities at runtime.

- Monikers. A flexible way to name and hold references to objects.

Digital has announced its intention to add the following components on top of OLE Integration:

- Class Model. Providing traditional class inheritance, this greatly simplifies the job of creating and reusing object classes. This inheritance is binary, which allows base classes to be developed in any language and/or to be on a remote machine.

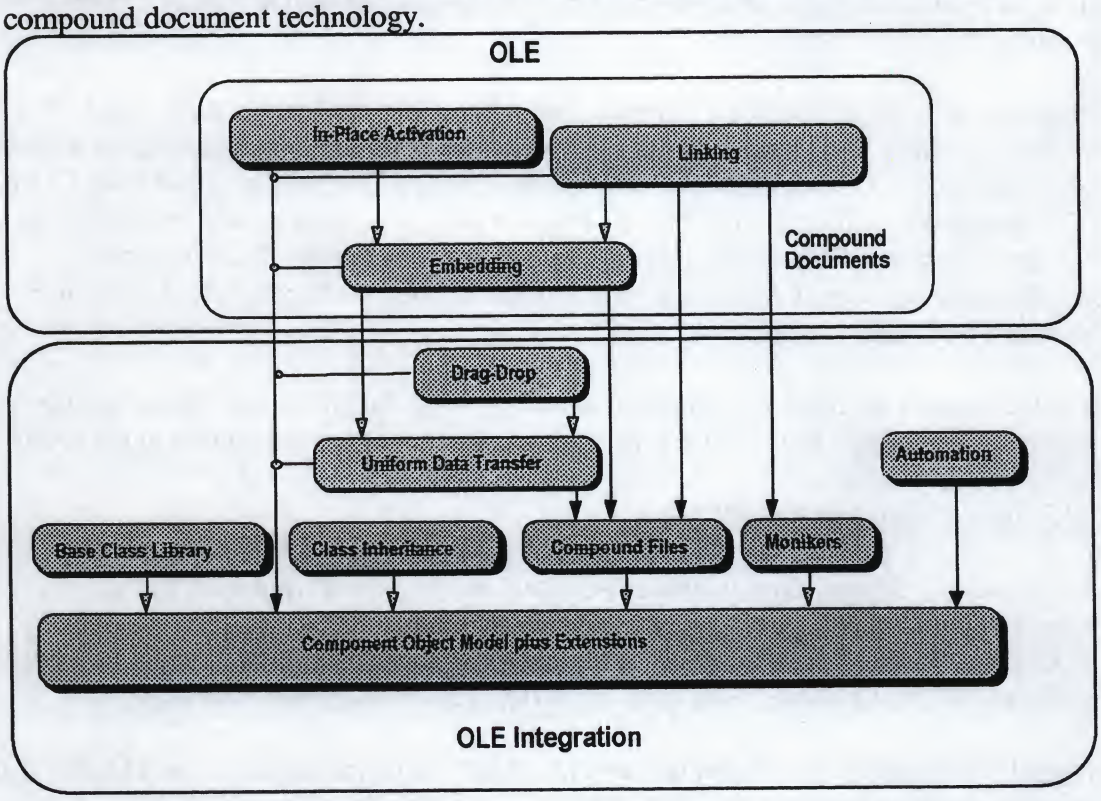
- Base Class Library. A set of classes similar to non-GUI C++ base classes, they can be use from (and passed as arguments between) OLE Integration objects written in any language.

- CORBA Interoperation. A set of usage guidelines and a transparent mapping to provide a bridge between the worlds of OLE Integration and CORBA objects and servers

OLE Integration and OLE

OLE Integration is the object technology underlying Microsoft's Object Linking and Embedding (OLE) system, which is a windowed visualization system for compound documents. All OLE objects are, by definition, OLE Integration objects, but all OLE Integration objects are not necessarily OLE objects. OLE Integration extends this component-based technology beyond the realm of compound documents to a richer set of business systems.

The boundary between OLE Integration and OLE was initially specified in the COM Specification document. Before Microsoft and Digital agreed to jointly develop what had been called the "Common Object Model" (COM), the term "OLE" was used to describe both COM and OLE together. As COM -- recently renamed "OLE Integration" -- is used and developed independently from OLE, the two terms will become more clearly distinguished in the industry. In essence, OLE is OLE Integration plus windowed compound document technology.



Digital provides an OLE Network Portal in its ObjectBroker V2.5 product. The portal provides an intermediate step between OLE applications that interoperate on a single machine today, and a true distributed object system based on OLE Integration. ObjectBroker's Network Portal means that software developers can begin to "network-

enable" OLE applications now, with assurance of a clear upgrade path to fully distributed OLE Integration.

Multi-Language Interoperability in OLE Integration

Each object-oriented language, such as C++ or Smalltalk, has its own object model. This "language object model" defines how objects in the language are constructed and used. Since object oriented-languages tend to have complex, construction-oriented object models, their objects are tightly bound to their language environments. In general, this means that only code written in the same language as the object's implementation can access such an object.

OLE Integration's object model was designed to cross language boundaries by allowing communication between objects constructed in almost any language. OLE Integration achieves this by being primarily an "interface" model as opposed to a "construction" model. OLE Integration provides simple but powerful rules for accessing an object, and for the way in which an object makes itself accessible from any language. OLE Integration gives the developer great freedom in how the object is constructed, which makes it relatively easy to use object-oriented languages (as well as 3GLs or 4GLs) to construct client or object code.

Of course, if an object-oriented language, including C++ and Smalltalk, is used to access or construct OLE Integration objects, the programmer can use only those object features which map into OLE Integration. In C++, both internal (C++) and external (non-C++) OLE Integration objects are directly accessed as carefully constructed C++ objects. In Smalltalk, external OLE Integration objects are accessed through OLE Integration /Smalltalk proxy objects which use the C callout mechanism to reach the actual OLE Integration objects.

Similar features for other languages are possible, as are language-specific integration features for making the use of OLE Integration objects even more natural in the future.

OLE Integration and CORBA®

The Common Object Request Broker Architecture (CORBA) from the Object Management Group is an attempt to define an industry standard for remote object invocation. Products may or may not be compliant with the CORBA specification, but the labels "CORBA compliance" and "CORBA support" can be misleading.

Digital's ObjectBroker includes our very successful implementation of the CORBA V1.2 standard, but that standard does not address interoperability among CORBA implementations. Thus even having 100% CORBA-compliant implementations from different vendors does not guarantee that their respective objects can communicate or interoperate with objects from a different CORBA implementation. The CORBA V2.0 specification does address interoperability and Digital will implement that standard in ObjectBroker in a future release.

OLE Integration is not CORBA-compliant and is not likely to become so because CORBA does not provide the functional capability needed to build and support desktop object systems such as OLE. For example, CORBA is structured for remote invocations (making it less suitable for in-process use), and lacks the flexibility provided by the run-time API negotiation features of OLE Integration.

CORBA provides the benefits of an industry standard by being endorsed and supported by a wide variety of vendors. Digital fully supports the OMG standards process and will continue to protect customer investments in CORBA-based software. Thus the most important aspect of the OLE Integration/CORBA discussion is that Digital will provide the infrastructure needed for interoperation between OLE Integration and CORBA objects -- "interconnectivity that counts."

The ObjectBroker product will be **both** OLE Integration - and CORBA-compliant. In general, a OLE Integration client will be able to see and use CORBA objects as though they were OLE Integration objects, and vice versa, to the extent that OLE Integration and CORBA object models map to each other. Some CORBA objects that heavily use multiple interface inheritance may not map well into OLE Integration. However, OLE Integration objects should map into CORBA easily.

OLE Integration and SOM/DSOM

OLE Integration and IBM's System Object Model (SOM®), coupled with its layered Distributed SOM (DSOM®) facility, are similar in many respects. Digital believes that OLE Integration is clearly superior in a number of ways.

There are important differences between OLE Integration and SOM as object models. OLE Integration clearly distinguishes between an object's *interface* and its *construction* (or class), which makes it very easy to implement multi-language or distributed objects.

In SOM (the non-distributed model), the interface/class split is not as clean. In addition, SOM was designed as a local (in-process) model with distribution layered on top of it later. This has led to some problems in making all the SOM features transparently distributable. Class variables are a good example.

Within a single process, a common class variable across all instances is easy to implement. However, in a distributed environment, each process either has different values of the variable or a slow, complex updating mechanism must be used to keep all the values synchronized. The problem here is that the class variable concept itself is difficult to distribute, and once used in the in-process environment, it will cause problems when an attempt is made to use it in a distributed environment. There are more practical ways to achieve the same functionality, and because OLE Integration was developed as a distributed model from the start, it avoided class variables.

Generally, SOM is a heavier-weight, fuller-featured object model (and implementation) than is OLE Integration, which of course can be both a blessing and a curse. For example, consider SOM's metaclass capability.

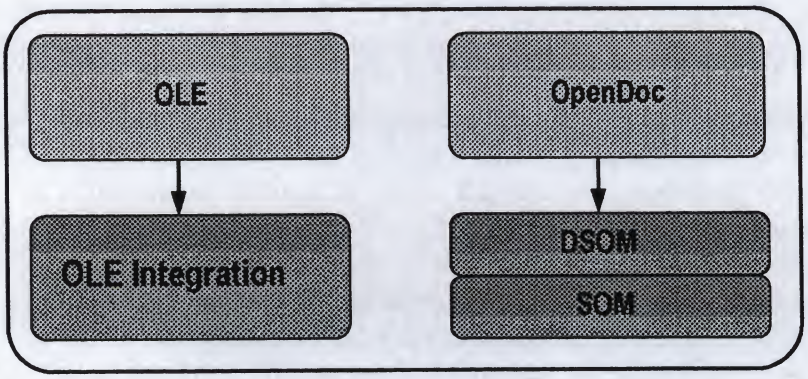
Metaclasses are an academically elegant way to define object creation (a metaclass can be thought of as the class for a "factory object" which creates the object instance that is ultimately desired). However, many people find metaclasses to be somewhat difficult to understand. OLE Integration, being a lighter-weight model, does not include metaclasses but neither does it *preclude* them. Metaclasses can be added if and when truly needed -- but they are not imposed on everyone who uses OLE Integration.

Class inheritance is another example. SOM has built in class inheritance and made it dependent on their metaclass facility; In contrast, Digital has added a complete but simple class inheritance capability on top of OLE Integration, and those who do not want class inheritance need not use it.

OLE Integration and SOM/DSOM both embody object technology. Digital chose OLE Integration because it is compatible with the industry-standard desktop, and because its lightweight nature makes is easily extendable to new environments and capabilities. In addition, OLE Integration and OLE have demonstrated their superiority in real-life distributed environments, and have provided the features ISVs want and need in a timely fashion.

OLE Integration/OLE and SOM/DSOM/OpenDoc

OpenDoc® is a GUI compound document architecture being developed and used by IBM and Apple. OpenDoc uses SOM/DSOM for its underlying object technology.



As described above, SOM/DSOM are roughly analogous to OLE Integration, though Digital believes OLE Integration is superior to SOM/DSOM in several ways. On paper, OpenDoc is roughly equivalent to OLE. However, OLE is in use by thousands of ISVs and embedded in many major applications in use around the world.

Digital Equipment Corporation
Enterprise Object Software

Summary

OLE Integration is system-level object technology provided by Digital, the leader in distributed client/server computing, and Microsoft, the provider of the *de facto* industry-standard desktop platform.

OLE Integration ensures that objects written by different programmers in different organizations behave in a well-known and consistent manner so that they can interoperate. OLE Integration's binary standard means that is language-neutral and very fast for local operations.

OLE Integration objects support older interfaces even after new versions are deployed, and objects can negotiate a mutually acceptable interface at run-time. The end result is a true plug-and-play object system for distributed applications. Software developers can use ObjectBroker V2.5's OLE Network Portal to begin to create distributed OLE objects, with a clear upgrade path to distributed OLE Integration.

Digital Equipment Corporation
Enterprise Object Software



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digital™

Digital DCE for Windows NT

White paper: Bringing the enterprise to your desktops



June 1995

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The Distributed Computing Environment (DCE) provides the key to solving today's complex IS problems with a client/server model — a model that encompasses the growing computing needs that now extend from corporate desktop PCs to corporate computing levels. The Digital DCE family of products provides customers with a complete, interoperable set of services that support a distributed computing environment as specified by the Open Software Foundation's Distributed Computing Environment (OSF DCE) standard.

It's more than a network, it's your business

Emerging from the technological explosion of the 1980s into the fiscal implosion of the 1990s, you face increasing and apparently conflicting demands. You need to find a way to compete in a global market. You need to respond quickly to changes in the business environment, protecting corporate investments in equipment, data, and personnel. You need to increase productivity, not just in the IS department but across the corporation. You must make a cohesive system from a variety of types and sizes of computers scattered across your organization, including proprietary systems, applications, and protocols that don't talk to each other. To succeed in your business, you must reduce the cost of doing business.

Integrate your business with DCE

OSF DCE provides a set of integrated software services that simplify the development, maintenance, and use of distributed applications in a multivendor environment. The basic services include:

- *Cell Directory Service (CDS)* — Provides the unique network addresses of named resources, such as users, servers, applications, and systems within a distributed computing environment. CDS ensures constant availability of directories and access to networked resources when they are needed through replication of name services. Applications can use networked resources without knowing where they physically reside or whether their physical location has changed. CDS includes an application programming interface (API) to the X/Open Directory Services (XDS). With XDS, application programmers can use a single API to gain access to both CDS and to the Global Directory Service (X.500), a powerful general-purpose distributed database service that can be used for intercell communications.
- *Distributed Time Service (DTS)* — Keeps clocks closely synchronized in a distributed computing environment. DTS synchronizes time with Coordinated Universal Time (UTC), an international time standard that is interoperable with the Internet's Network Time Protocol (NTP). DTS enhances the dependability of a network because events occur in the correct sequence. DTS puts time stamps on applications and their procedures, which ensures operational integrity.
- *DCE Security* — Provides secure communications and controlled access to resources in a distributed system using authentication, authorization, and data integrity. Authentication verifies user and service identities. Authorization controls access to resources. Data integrity mechanisms protect data from tampering and nonprivileged access attempts. In this way, client support of security ensures that the integrity of application data is preserved. Security also protects applications that are interoperating across different platforms, such as a Windows NT client application using a DCE server on a Digital UNIX or OpenVMS system.
- *Remote Procedure Call (RPC)* — Lets individual procedures of an application run on systems anywhere on the network. RPC extends the typical local procedure call model by supporting direct calls in a C-like language, called the Interface Definition Language (IDL), to procedures on remote systems. Programmers can develop distributed applications as easily as they developed traditional, single-system applications.
- *DCE Threads* — Provides a simple programming model for building concurrent applications that perform many operations simultaneously. A server process using Threads can respond to many client requests at the same time, improving the performance of every application.

Digital extends DCE to Windows NT

Today, Digital offers DCE on more platforms than any other vendor. Now Digital DCE is supported on six platforms:

- DCE for Digital UNIX
- DCE for DOS Windows
- DCE for OpenVMS VAX
- DCE for OpenVMS Alpha
- DCE for Windows NT Alpha
- DCE for Windows NT Intel

With the addition of DCE for Windows NT Alpha and Intel, Digital has assumed the leadership position in distributed computing by offering flexibility and choice for DCE development and use. With our proven expertise in enterprise computing and DCE, as well as early and vigorous support of Windows NT as demonstrated by the Windows NT Alpha product, Digital is uniquely positioned to offer DCE on Windows NT.

As a Windows NT user, you can now take advantage of all DCE-based, enterprise-wide distributed applications in a multivendor, client/server environment. Application developers have an additional platform choice for designing and building clients and servers that can interoperate over a wide range of operating systems and networks, including the Windows NT operating system.

Digital DCE for Windows NT

Digital DCE for Windows NT brings the enterprise to the desktop by:

- Offering the first DCE product set for Windows NT, including support on both Alpha and Intel platforms
- Providing base distributed computing technologies that enable the development of multivendor, client/server applications from your PC
- Enabling Windows NT to be a full-fledged member of your DCE cell
- Integrating tightly with Windows NT: uses native Windows NT components where they already exist; other components updated to be more compatible with the Windows NT environment

This newest member of Digital's DCE product family extends the DCE environment to the leading-edge Windows NT platform with the full, interoperable set of distributed computing services. The second release, V1.0a, is available today for Windows NT V3.5 Workstation and Server, and offers the Digital DCE Run-time Services and the Digital DCE Application Developer's Kit. These components allow you to use your Windows NT system to develop distributed applications that can operate in a multivendor DCE cell. DCE on Windows NT Version 1.1 (available in mid-1995) will offer DCE Security and Cell Directory Services, as well as a complete DCE management tool (see below). In addition to the basic run-time capabilities specified by the OSF DCE standard, DCE for Windows NT includes the following enhancements:

- *DCE RPC mapped to Microsoft RPC* — Transparent mapping of the full OSF RPC API to the Microsoft RPC (MS-RPC) API allowing DCE applications to be ported to the Windows NT platform by a simple recompilation.
- *Support for multiple transports* — Automatic support for all Windows NT network transports.
- *CDS tailored to single-user system* — Local name caching to speed up the time it takes to look up a resource name.
- *Open, interoperable threads support* — Support for the POSIX 1003a.4a interface through native NT threads, ensuring a standards-based thread capability as well as interoperability between NT kernel threads and DCE Threads.
- *Enhanced time management support* — Use of the NT kernel's ability to gradually speed up or slow down the time-of-day clock without affecting applications.
- *DCE support for the NT exception handler* — Support for DCE standard exception semantics through internal calls to the Microsoft C built-in exception handler. Programmers see DCE messages that describe what application error occurred and where.
- *DCE Director (V1.1)* — A graphical tool that greatly simplifies the management and administration of a DCE environment (available mid-1995).

The Internal Architecture section of this document describes these enhancements as well as other implementation details.

Digital DCE for Windows NT packages

Digital offers four DCE product packages for Windows NT. The first two of these comprise V1.0a of the product, and all four comprise V1.1 of the product:

1. *Digital DCE Run-time Services* — The Run-time Services Kit allows Windows NT applications to use full, secure DCE client functions. The Run-time Services Kit allows development of DCE client and server applications, through the Application Developer's Kit. One Run-time Services Kit is required for each system in the DCE environment. The Run-time Services Kit offers:
 - Administrative tools (see DCE Director below)
 - Time Service for both client and server
 - Remote Procedure Call (RPC) Run-time API and Library:
 - Access to DCE Threads for developing multithreaded applications
 - Use of CDS for locating servers
 - Use of DCE Security for authentication, authorization, and data integrity
 - Name service interface daemon (nsid) for communication with MS-RPC applications. The nsid allows MS-RPC client and server applications to perform name service operations on the full CDS namespace.
2. *DCE Application Developer's Kit for Windows NT* — Provides the tools required for developing DCE applications on the Windows NT operating system. These applications can then interoperate with other DCE vendors' platforms, calling on servers located on other DCE systems. The Developer's Kit includes:
 - Digital's advanced RPC IDL compiler tool kit, offering:
 - All OSF DCE Version 1.0.3 features
 - DEC Fortran language support on Alpha platforms
 - Application Template Generator — The IDL compiler uses your interface definition file to generate a C language template that you can modify to create executable client and server application code.
 - Event Logger — A software utility that helps you debug RPC applications by logging detailed RPC data during application execution.
 - Sample programs and example source code
 - All DCE application programming interfaces
3. *DCE Cell Directory Server (CDS) (available with V1.1)* — Provides a consistent mechanism for naming and locating users, applications, files, and systems within a DCE cell. The CDS Server also includes the Global Directory Agent

(GDA). The GDA provides a means of linking multiple CDS namespaces via either X.500 or the Internet Domain® Name Server (BIND). Users must install the DCE Run-time Services Kit on each system in the cell before installing the Digital DCE CDS Server. The DCE CDS Server also requires the installation of the DCE Security Server on a system in the same DCE cell.

4. *DCE Security Server (available with V1.1)* — Allows users controlled access to information in a distributed computing environment safely and confidentially. The DCE Security Server accomplishes this through three services:

 - DCE Authentication Service allows users and resources to prove their identity to each other. The DCE Authentication Service is based on Kerberos, which requires that all users and resources possess a secret key.
 - DCE Authorization Service verifies operations that users may perform on resources. A DCE Registry Service contains a list of valid users. An Access Control List (ACL) associated with each resource determines valid users through the Registry Service, and the types of operations a user may perform.
 - DCE Data Integrity Service protects network data from tampering. Cryptographic checksums automatically generated by RPC enable DCE to determine whether data has been corrupted in transmission.

Users must install the DCE Run-time Services Kit on each system in the cell before installing the Digital DCE Security Server. The DCE Security Server also requires the installation of the DCE CDS Server on a system in the same DCE cell.

The Digital DCE for Windows NT product also includes the *DCE Director*. The DCE Director provides an easy-to-use management tool for the DCE cell administrator.

Digital DCE Director is an intuitive, easy-to-learn graphical user interface (GUI) for managing a DCE environment. DCE Director can manage all kinds of DCE hosts, since it uses strictly standard DCE protocols. The Director is bundled as part of the Run-time Services package. With Digital DCE Director, you can:

1. Create, modify, delete, and browse user accounts and security groups.

 When you create an account, the associated principal is created automatically. When you create an account or a group, at your option an associated CDS directory can be created as well. You can browse and change a group's membership list or the list of groups to which a user belongs. You can change a user's password, enable or disable the account, and control UNIX-related attributes such as the login shell.

2. Browse the CDS namespace.

 You can create and delete CDS directories, and easily specify where copies of a CDS directory are to be stored.

3. Edit ACLs of CDS objects and application objects.

 The presentation is simplified and clear, yet none of the flexibility of DCE ACLs is sacrificed.

4. Add nodes to the cell without giving out an administrative password.

 The user then completes the configuration from his/her own machine using a simple dialog and the user's own DCE password. With ordinary DCE, as provided by OSF, you must walk around and physically present a cell-administrator password at every machine to be added to the cell. This can involve a great deal of time for the administrator. Digital DCE Director avoids that labor without sacrificing security.

 The approach is highly task oriented and streamlined. For example, you can add a user to a cell by choosing one command and answering three or four questions.

 DCE Director comes with extensive online help, including many valuable cross references.

Digital DCE for Windows NT internal architecture

Digital DCE for Windows NT is implemented as an integrated layer between the operating system and network on the one hand and the distributed application on the other. As on all other Digital platforms, Digital DCE for Windows NT provides the services that allow a distributed application to interact with a collection of possibly heterogeneous computers, operating systems, and networks as if they were a single system.

Figure 1 shows DCE in relation to the Windows NT operating system, network communications software, and application software. Figure 1 also shows the DCE technology components that work together to implement the DCE layer. In Figure 1, the names of DCE services that are implemented in a different way from other Digital DCE implementations appear in italic typeface. The following sections describe these differences.

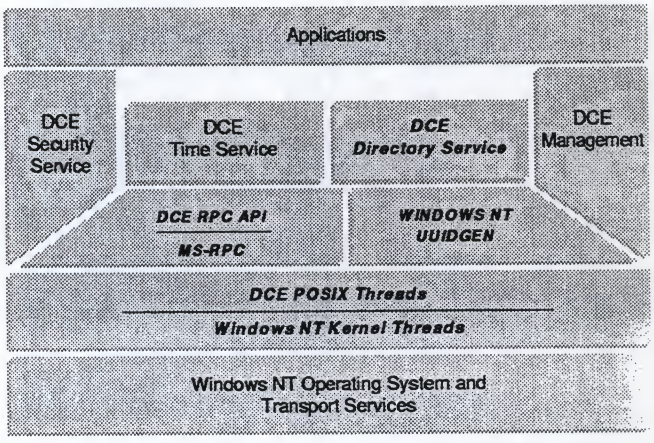


Figure 1 Digital DCE for Windows NT architecture

"Secure core" DCE RPC

Digital DCE for Windows NT provides a full-function, OSF DCE conformant RPC API using MS-RPC native technology.

Digital's DCE RPC is implemented as a paper-thin layer above the Windows NT native MS-RPC. The mapping between the DCE RPC API and the MS-RPC is transparent to the application developer. Digital DCE RPC also returns standard DCE RPC status codes through a similar transparent mapping from the MS-RPC error status codes. Digital's layered implementation, with transparent mapping to the underlying MS-RPC API and status codes, allows you to port DCE applications easily to Windows NT while retaining source-code compatibility across open DCE environments.

Authenticated RPC, which is integrated with the Digital DCE RPC API and MS-RPC API, is implemented as a separate Dynamic Link Library (DLL). The DCE Security implementation on Windows NT allows access to the full set of DCE Security APIs from DCE RPC. The Digital DCE Security DLL is called by MS-RPC whenever it sends or receives an authenticated DCE RPC call.

Figure 2 shows the roles of application code, RPC stubs, and RPC run-time libraries during a remote procedure call. As in Figure 1, operational differences between the Windows NT implementation and those on other Digital platforms appear in italic typeface.

Figure 2 shows the client's application code making a remote procedure call and passing the input arguments to the stub for the called DCE RPC interface. The client's stub translates the input arguments from the local data representation into the network representation and dispatches the call to the client's RPC run time. On the Windows NT platform, the DCE RPC call is converted into an MS-RPC call that is dispatched by the MS-RPC run time over the network to the server's RPC run time. If the DCE RPC call includes authentication information, DCE RPC invokes the MS-RPC run time, which invokes the Digital DCE Security (DLL). The Digital DCE Security DLL verifies the identity of the requesting user or service and returns the information to the MS-RPC run time, after which the call is dispatched to the server.

If the server was compiled on a Windows NT platform, the server stub uses its copy of the MS-RPC run time to translate the input arguments from network to local data representation before passing them on to the called remote procedure. DCE RPC converts the call into DCE RPC syntax before passing the input arguments to the called remote procedure. For a server compiled on a non-Windows NT platform, the server stub uses its copy of the DCE RPC run time to translate the input arguments from network to local data representation and pass them directly to the called remote procedure.

If the DCE RPC call includes authentication information, DCE RPC invokes the MS-RPC run time, which in turn invokes the Digital DCE Security DLL. The Digital DCE Security DLL verifies the identity of the requesting user or service and returns the information to the MS-RPC run time. The MS-RPC run time returns the authentication information to the DCE RPC call.

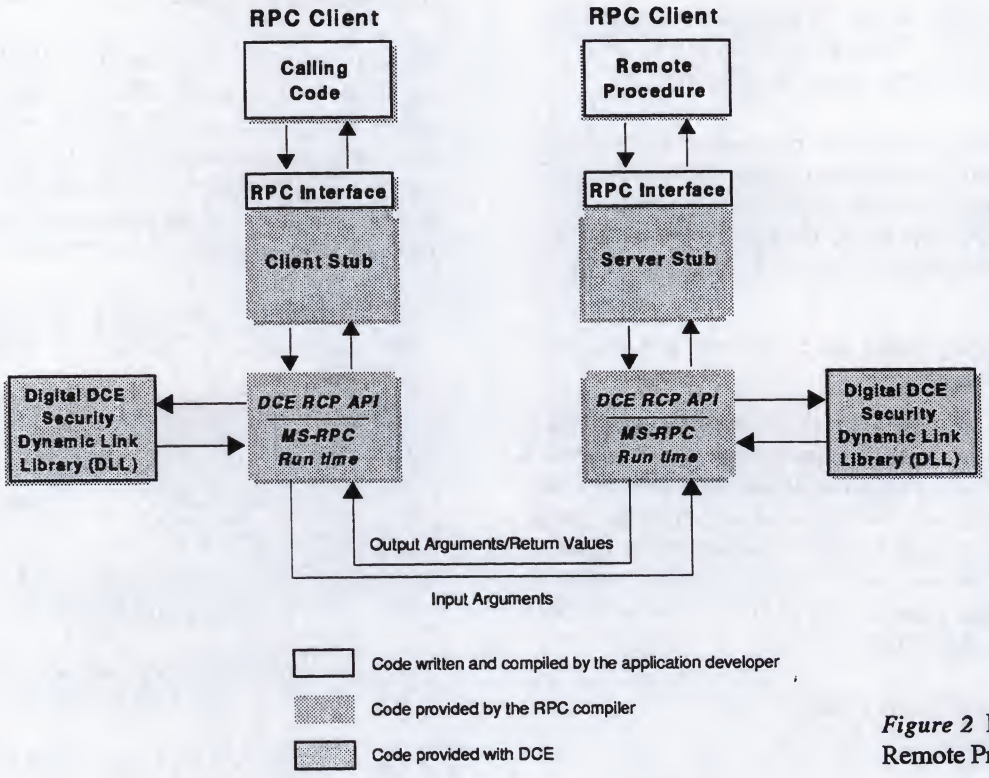


Figure 2 Execution of a Remote Procedure Call

The procedure then executes and returns any results to the server's stub. The server's stub translates the results and passes them to the server's RPC run time. DCE RPC converts the results, which are output arguments or a return value or both, into MS-RPC syntax and passes them to the MS-RPC run time. The run time dispatches them back over the communications network to the client's MS-RPC run time. DCE RPC converts the results into DCE RPC syntax and dispatches them to the client's stub.

The client's stub uses its copy of the DCE RPC interface to translate output arguments from network to local data representation and pass them to the calling code.

Enhanced IDL compiler tool kit

Digital's DCE IDL provides all the Digital enhancements to IDL, such as the Event Logger, offered in other Digital DCE products. The Event Logger is a software utility that records information about operations relating to the execution of an application. Operational information about the program state at a specific point during processing is recorded in a file or to a terminal screen. This facility provides a detailed view of the execution of your RPC application, which can be extremely valuable during application debugging and tuning.

When you use DCE IDL, you are assured application portability to any vendor's DCE environment, in any DCE cell, as well as interoperability with every other DCE-conformant application.

Compiling, linking, and generating UUIDs

In addition to using the DCE Application Developer's Kit tools to compile and link the DCE RPC application, you must also use some components in the Windows NT Software Developer's Kit (SDK) or Visual C++. You will need to compile your application using some of the MS-RPC header files, and you will need to link in the MS-RPC libraries.

Digital DCE for Windows NT uses the native Windows NT Universal Unique ID Generator (UUIDGEN). UUIDGEN is a tool that is used to generate an IDL file template that contains a new UUID.

CDS tailored to single-user design on Windows NT

Digital DCE for Windows NT provides the full range of CDS services available in other Digital DCE products. As an example, the command-line control program that manages the CDS directory (CDSCP) works the same way as CDSCP on the DCE on Digital UNIX and OpenVMS implementations. Similarly, applications can access CDS services through two standard DCE open interfaces: the DCE name service (rpc_ns) routines and the X/Open XDS interface.

The CDS client implementation differs internally from other Digital DCE products because it uses a per-user name cache to reduce calls to the server, eliminating the need for a CDS clerk process. In this way, Digital enhanced the original DCE CDS internal design, which is based on a time-sharing paradigm, to take advantage of the single-user design of the Windows NT operating system. Digital's internal restructuring of CDS affords better response time, reliability, and security, while preserving both the standard semantics of CDS API calls used in all other DCE environments as well as external control program commands. Figure 3 illustrates the use of per-user name caches on an RPC client call to look up a name in CDS. The first name lookup on behalf of user 1 searches the CDS namespace server for the name. Once that name has been looked up, subsequent lookup requests from user 1 for the same name are made to the CDS user 1 name cache.

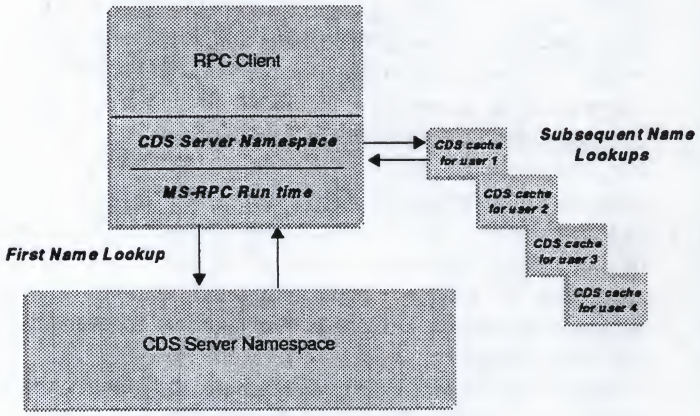


Figure 3 CDS name lookups

Open, interoperable threads support on Windows NT

The Digital DCE for Windows NT Run-time Services implementation of DCE Threads, or pthreads, ensures a standards-based thread capability and interoperability between Microsoft's native Windows NT threads and DCE Threads:

- Standards-based — DCE Threads are conformant with POSIX P1003.4a Draft 4.
- Interoperable with Microsoft Windows NT Kernel Mode threads — DCE Threads provides a one-to-one mapping of a DCE thread to a Windows NT kernel mode thread.

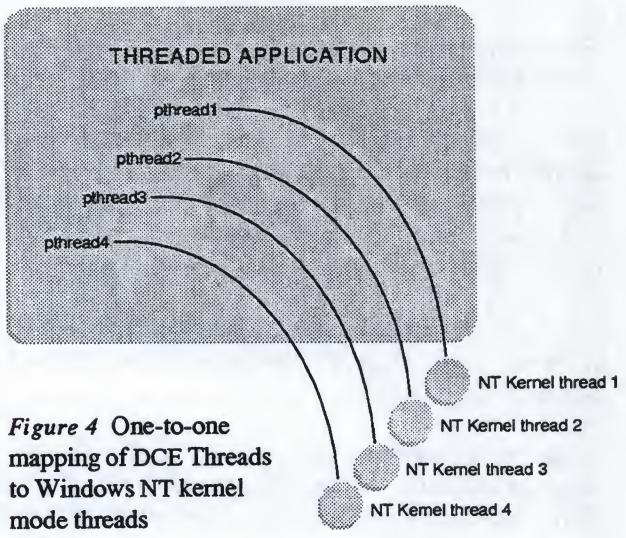


Figure 4 One-to-one mapping of DCE Threads to Windows NT kernel mode threads

Microsoft applications that use native Windows NT threads can continue to use them while calling DCE services; new application modules can be written using DCE pthreads.

Enhanced time support on Windows NT

The implementation of DCE DTS for Windows NT takes advantage of the enhanced Windows NT kernel's ability to speed up or slow down the time-of-day clock that synchronizes one system with the rest of the cell. In previous versions of Windows NT, the clock could be moved forward or back, but the tick rate could not be changed. The new Windows NT kernel enhancement allows DTS to make time changes gradually without affecting applications. This is important because it means that time stamps are always advancing and the correct ordering of distributed events can be determined.

Integration with Windows NT exception handler

In Digital DCE for Windows NT, DCE status codes and exceptions are closely integrated into the native Windows NT environment so that application programmers see standard DCE text messages that describe what error occurred and where. DCE status codes are implemented as native Windows NT message codes by the mapping of IDL error status data types to native NT messages, providing transparent translation of messages. This implementation allows DCE applications full use of the superior Windows NT structured exception handler while preserving the appearance of standard DCE messages. The DCE exception semantics are primarily supported through calls to the Microsoft C built-in exception support.

Simplified DCE management

As part of DCE V1.1 for Windows NT, Digital provides the DCE Director — an intuitive, easy-to-learn GUI for managing a DCE environment. DCE Director lets you perform the following functions:

- Manage user accounts and security groups.
- Create and delete CDS directories, and easily specify where failover replicas of a CDS directory are to be stored.
- Edit ACLs of CDS objects and application objects.
- Register computers as members of a DCE cell from your desk, without giving out an administrative password.

DCE Director offers a highly task-oriented, streamlined management model. For example, you can add a user to a cell by choosing one command and answering three or four questions. DCE Director also comes with extensive online help, including many valuable cross references.

DCE Director runs under the V3.5 release of Windows NT. However, it can manage all kinds of DCE hosts because it uses standard DCE protocols.

Support for multiple transports

Since the DCE RPC run time is based on MS-RPC, Digital's fully integrated software automatically supports all the current and future MS-RPC transports. Network transparency is ensured to both the user and the application developer because client/server applications can interoperate over the following network protocols:

- TCP/IP
- UDP/IP
- Windows NT local RPC
- Named Pipes
- NetBEUI/NetBIOS
- IPX/SPX
- DECnet Phase IV

Digital DCE RPC supports DECnet when Digital PATHWORKS for Windows NT is installed. Datagram transports (such as UDP and IPX) are not supported in the current release.

How do I get Digital DCE for Windows NT?

It's easy. Call DECdirect at 1-800-344-4825. Press "1" for the first option; press "1" for the second option.

Both the Intel and Alpha versions of the product are on the same CD, so you don't have to specify which version you want. You will be licensed to actually run only one of these versions.

The "QB" kits contain the media, a single license, and the basic online documentation for either the Run-time Services or the Advanced Developer's Kit (ADK). For additional licenses you should order the "QM" part number. "QA" is the documentation kit and contains additional documentation published by Prentice-Hall, Inc. and O'Reilly & Associates.

Below are the part numbers and list prices.

- DCE Run-time Services for Windows NT (available *now*):
 - QM-2ZGAA-AA DCE Run-time Services V1.0 for Windows NT ($95)
 - QB-2ZGAA-SA DCE Run-time Services V1.0 for Windows NT Media/License ($135)
 - QA-2ZGAA-GZ DCE Run-time Services V1.0 for Windows NT Documentation ($195)
- DCE Application Developer's Kit for Windows NT (available *now*):
 - QM-2ZKAA-AA DCE Application Developer's Kit V1.0 for Windows NT ($295)
 - QB-2ZKAA-SA DCE Application Developer's Kit V1.0 Media/License ($335)
 - QA-2ZKAA-GZ DCE Application Developer's Kit V1.0 Documentation ($125)

Hardware and software requirements

Digital DCE for Windows NT is supported on any system that supports Windows NT Version 3.5.

Requires Windows NT SDK or Visual C++.

MS-RPC and Windows NT Threads are provided by Microsoft with the Windows NT operating system.

PATHWORKS for Windows NT Version 5.0 is optional.

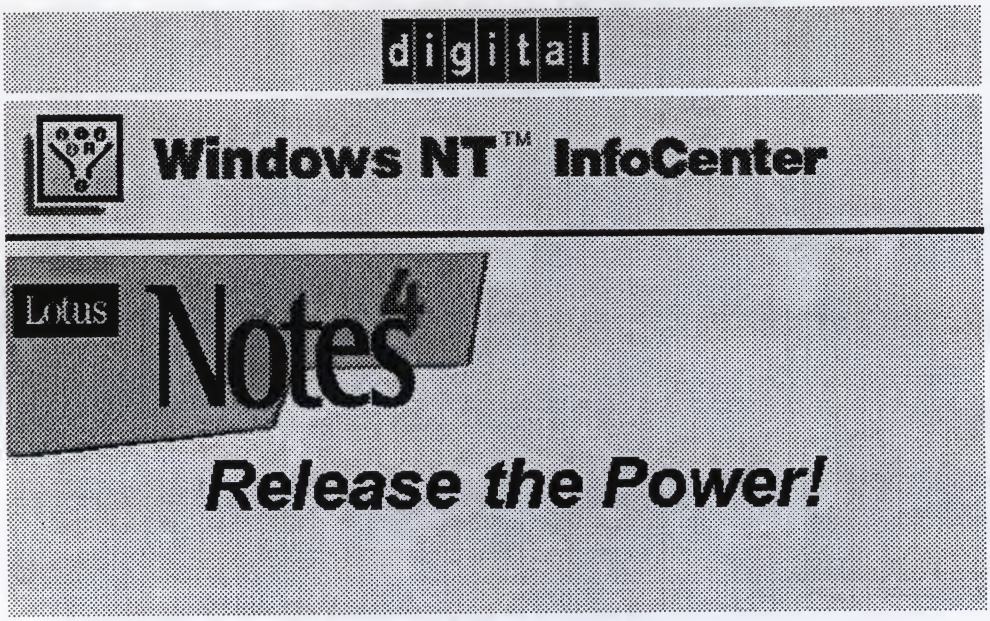
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Frequently Asked Questions About Lotus Notes on Windows NT

Lotus Notes & Digital's AlphaServer systems

When will Lotus Notes be available on Digital AlphaServer systems? On Windows NT? On Digital UNIX?

On April 2, 1996, Lotus Development Corporation issued a press release announcing the availability of Lotus Notes on AlphaServer systems running Microsoft Windows NT. The software is scheduled to ship on April 19, 1996. A coupon will be included with all AlphaServer systems running the Windows NT operating system from April 22 to September 30, 1996, which entitles customers to a free copy of Lotus Notes.

Lotus also intends to ship Lotus Notes on AlphaServer systems running Digital UNIX at the end of CY'96.

Is Lotus Notes available on Digital Intel platforms?

Yes. Lotus Notes Release 4 shipped in January, 1996 on Prioris Intel servers running the OS/2 or Windows NT operating system. Windows 3.1 and Win 95 clients also shipped. Lotus Notes (1 client license, 1 server license) is currently bundled free of charge with Digital Prioris servers.

What is the price of Lotus Notes on Alpha?

Lotus Notes is priced the same, regardless of manufacturer. A server license is $495 for a single CPU server, and $2295 for a multiprocessor server. Lotus Notes will be offered free of charge with the purchase of an AlphaServer system, from April 22 to September 30, 1996.

How many Notes users can AlphaServer systems support?

Digital is currently using NotesBench, a benchmarking tool which was developed by Lotus Development Corporation to characterize the relative performance of Notes on a variety of hardware platforms. Clearly, the number of users able to be supported on a server is dictated by the complexity of the Notes workload (simple mail versus full text searches), the number and type of other applications on the server, and the capacity needs required on the server.

A performance flash summarizing the audited NotesBench results for several Prioris and AlphaServer systems will be available in May on the web. A press release with these results will also be issued at that time. Capacity planning and sizing guide for Lotus Notes on Digital Prioris and Alpha systems will be available in May as well. Technical support groups from Digital and several key business partners have been trained on Lotus Notes, and Digital's Landover, MD Benchmark Center also has a copy of NotesBench to assist customers with relative sizing. Finally, Digital will be presenting performance and capacity guidelines at the upcoming tour called Lotus Symposia.

How does Lotus Notes differ from Notes versions shipping on other platforms?

Lotus Notes Version 4.1 is the same source pool whether it is running on Intel or Alpha. Notes has been rigorously tested and deployed across multiple vendors' platforms for the past several years. Alpha derives the full benefit of the thousands of man years of testing on the Lotus Notes product. Also, all of the NT compilers run on Alpha, and the NT operating system is closely tuned and optimized for the Alpha architecture. By choosing the Alpha platform, you will see an immediate performance gain reap the benefits of this mammoth development effort.

What system and network management tools does Digital offer so that I may easily integrate AlphaServer systems into my existing network of Intel systems? How do these solutions compare with Quick Start from COMPAQ?

Digital's ServerWORKS system software is included with every AlphaServer system. ServerWORKS Manager V1.1 provides a comprehensive "out-of-the-box" management solution to manage Digital servers and departmental/workgroup LANs. Every AlphaServer system also includes key components of the PATROL application management product suite by BMC Software for Support of leading database and application platforms, including Lotus Notes.

By including the BMC PATROL Agent and BMC PATROLVIEW for ServerWORKS, Digital is able to provide not only hardware and operating system level management, but also provide a way to manage mission critical applications running on AlphaServer systems, and distinguish problems which occur at the network, operating system and application level.

Digital's ServerWORKS and BMC's PATROL seamlessly integrates with Digital's POLYCENTER Manager for NetView, and other popular network management offerings, which allows management and monitoring capabilities to be viewed natively within an existing third party framework. No other vendor, including COMPAQ, provides system, network AND application management, free of charge with every system.

Resources

What is the announcement plan for Lotus Notes on Alpha? What sales tools and reference materials will be available at the time of announcement?

A press release was issued by Lotus on April 2, 1996. A sales kit, orderable through Digital's Literature Ordering system, order # EE-E6713-68 will be available May 1, and most of the kit contents will be available on the Web by announcement day. It will contain brochures, sales tools, presentations and other marketing collaterals. A sales flash will be issued to the Digital sales force and its partners.

Articles will appear in Lotus and Digital publications, including Sales/Customer Update, inFORM, Digital Today as well as Lotus Connects. There will not be a specific announcement venue planned, however Digital and Lotus will be showcasing the Notes solution on Alpha in several upcoming trade shows, including the Lotus European Technology Conference, EMA, Electronic Messaging Conference April 28 to 30 in Los Angeles, and at Spring Comdex in Chicago June 3 to June 6, as

well as other local events on an on-going basis. Also, Digital will be participating in the Lotus Symposia in the following cities:

4-17-96 ... Los Angeles
4-23-96 ... Washington, DC
5-14-96 ... Seattle
6-12-96 ... St. Louis
6-25-96 ... Vancouver
8-14-96 ... Chicago
8-27-96 ... Miami
9-25-96 ... Cincinnati
10-2-96 ... Houston
10-23-96 .. Boston

Contact your local Application Reseller Initiative Driver or Business partner for details.

Digital

When will other applications be available on Alpha?

Once the core Lotus Notes product is shipping on Alpha as of April 19, it is the intent of both Digital and Lotus to roll out supporting applications over time, including X.400, X.500, SMTP, ODBC, Note Pump and cc:Mail, for example.

What value can Digital's SI organization offer to a Notes Customer?

Digital's SI organization has a worldwide practice in enterprise messaging & mail systems. This group has highly skilled solutions architects, project managers, and design consultants that develop and implement messaging integration solutions, many based on Digital's MAILbus X.400/X.500 compliant mail backbone. This group has expertise working with Lotus Notes, cc:Mail, MS-Mail, MS-Exchange, and other mail systems, as part of large messaging integration projects. Many Lotus Notes customers want to seamlessly integrate and consolidate their messaging and mail systems, a service which Digital SI can provide.

What unique or relevant Notes Services are available from Digital's Multivendor Customer Services organization?

Digital's Multivendor Customer Services organization is offering 30 days of introductory telephone advisory support to assist customers through the initial implementation of Notes. It is available for a limited time only, and will not extend beyond December 31, 1996.

How will Lotus Notes be sold for Digital platforms?

Notes solutions will be sold by both Digital's Direct and Indirect sales channels. It is important to understand that implementing a Notes solution can require the expertise of a Notes solution provider. Often system integration (SI) services are required, as well as application development. Lotus has an established Business Partner Program, and the products and services provided by these Business Partners vary from SI services, to software applications, tools, support services and training. A complete list of Lotus Business Partners will be available soon. For information on a Business Partner in your area contact:

Dan Parisi
Digital Sales Executive
508-686-1951

In addition, Digital's SI organization has expertise in delivering Notes solutions, and Digital's MCS organization is a certified Notes Passport Provider, offering help desk services as well as fulfillment of Notes software.

What is Digital's Channel Strategy for Lotus Notes?

Notes solutions are well suited for almost any industry. Therefore, Digital will market Notes solutions across all of its distribution channels. The ABU will sell directly to its account base utilizing Notes solutions providers when applicable. The SBU (Systems Business Unit), will sell Notes solutions with the help of our Reseller channel, as well as existing and new Business Partners that have Notes-enabled solutions.

Why should a customer buy a Notes AlphaServer from Digital when they are so late to this market?

Digital is positioned today with a broad range of server solutions designed to accommodate your computing needs now and in the future. Alpha-based systems provide expandability, increased uptime, capacity for growth, and scaleable performance, from entry-level desktop to multiprocessing datacenter systems.

Choosing Digital AlphaServer systems allows you to implement the same quality Lotus Notes software that is available on Intel or other vendors' platforms, with the added benefit of deploying fewer servers for Notes and other applications. This translates into simplified system management and lower network administration costs. Ultimately, the total cost of ownership for Notes in your enterprise is greatly reduced with an Alpha solution.

Lotus Notes

In what markets and industries is Notes the strongest?

Thousands of vertical applications which work with Lotus Notes are available on the market today. The Lotus Notes product enjoys a strong reputation in many industries, including financial services, health care, education, insurance, education and manufacturing. However, Notes is perhaps better known in horizontal applications, such as sales force automation, customer service and human resources.

Local home | Digital home | Browse | Search | Feedback | Help

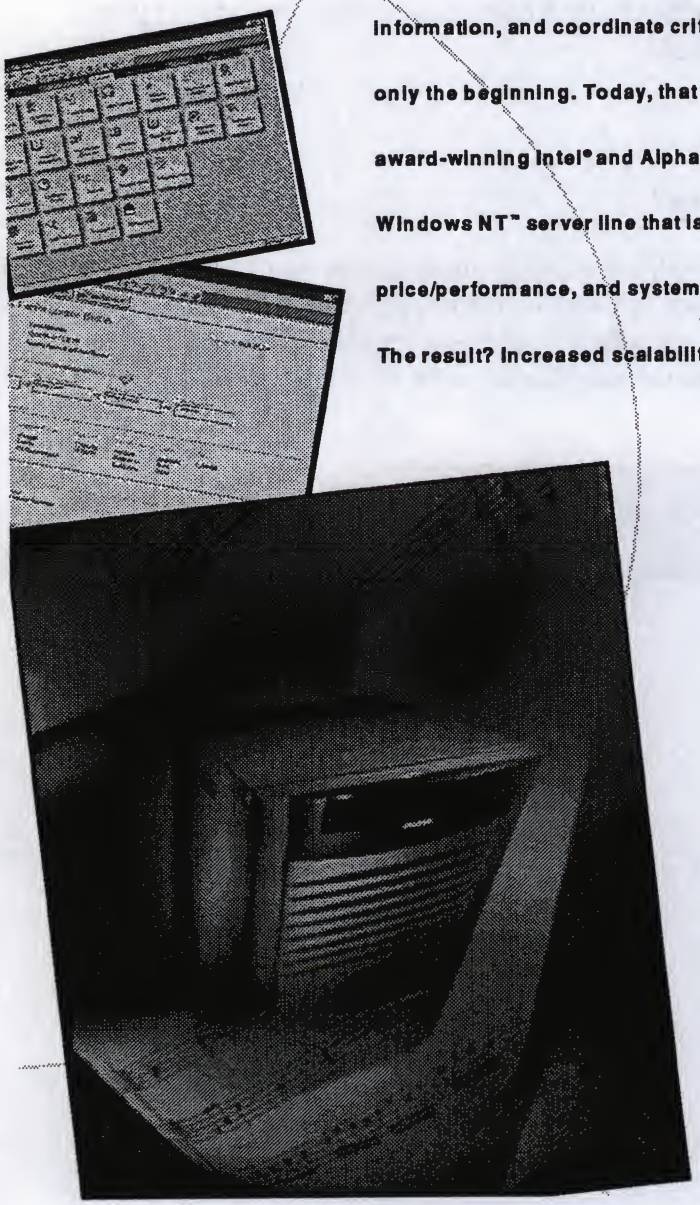
Updated May 6, 1996

TM

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Lotus Notes on Digital's server family

Do more with the world's most popular messaging and groupware product, powered by the world's most scalable, economical line of Windows NT servers



If you're using Lotus Notes, more power to you: the power to communicate key information, collaborate on projects and share information, and coordinate critical business processes. And that's only the beginning. Today, that power is matched with Digital's award-winning Intel® and AlphaServer systems — a robust Windows NT™ server line that is unsurpassed in performance, price/performance, and system and network management tools. The result? Increased scalability, manageability, and expandability.

The strength of Lotus Notes is derived from the combination of three essential technologies: Notes Mail, a reliable and innovative client/server messaging system; a powerful distributed document database; and a rich development environment.

Together, they offer one central access point for users to get the information they need, whether it's in a Notes™ application, a desktop application, a relational database, a mainframe system, or on the World Wide Web.

In short, Notes provides a single integrated interface to access all the information you need to get work done.

Server of choice for Notes

Why Lotus Notes on Digital's Windows NT servers? Because Digital systems maximize the power and capabilities of Notes.

This server family gives you more options — enabling you to take full advantage of the application richness Notes offers. And with Lotus Notes on Digital servers, you can accommodate more users on fewer systems, thereby:

- Reducing network complexity
- Simplifying system and network management
- Increasing operational efficiency
- Minimizing acquisition and operational costs

Add Digital's worldwide service and support, a close partnership with Lotus, and a strong alliance with Microsoft and the choice is clear: Digital takes Notes better than anyone.

digital™

Lotus Notes highlights

- **Advanced client/server messaging of Notes Mail delivers world-class reliability and manageability, and includes the cc:Mail™ user interface**
- **Built-in Internet and Intranet integration allows easy access to and sharing of Internet information**
- **Fast, efficient field-level replication capability saves time and reduces costs**
- **Administration Control panel provides a new level of ease for Notes management**
- **Unsurpassed Rapid Application Development enables creation of applications that run across all Notes platforms**
- **Strong mobile user support offers convenience and work-style flexibility**
- **Transparent multilevel security ensures that only authorized users have access to data**

Lotus Notes 4

The future is now

Today, more and more Notes users are turning to Digital to help them deploy applications on Windows NT-based Notes servers. Why? Because Digital has the right products and services to ensure successful results.

Server technology that is seamlessly integrated

Digital's Windows NT family of servers — from the Prioris line to the powerful AlphaServer family — offers price/performance at every level and is seamlessly integrated to provide the scalability and flexibility you need as application complexity grows and user numbers increase.

Digital's award-winning Prioris line offers low cost of acquisition and the best return on your IT investment, plus choice of power and capabilities.

Digital's Alpha platform, from the individual AlphaServer system to a network of AlphaServer clusters, transparently extends the Intel capabilities of Prioris with greater system-level capacities.

The power of Alpha enables you to consolidate users on fewer AlphaServer systems and allows you to build more demanding Notes-based applications as needed.

What's more, Alpha and Prioris servers come bundled with Digital ServerWORKS Manager, a complete package of integrated network management software tools that offers total control of the PC server network and network costs.

The resulting computing environment is less complex, simpler to manage, easier to maintain, less costly in terms of operational and resource expenses, and provides capacity levels that keep pace with business growth.

But don't just take our word for it. Take a look at the many awards Digital's servers continue to garner.

Recently, the AlphaServer system placed first in four out of five customer satisfaction categories in a *Computerworld* user survey. It has also consistently ranked number one in every category using Transaction Processing Council (TPC) benchmark tests.

This year, Digital's server family also took home 11 AIM "Hot Iron" awards — more than any other vendor.

The complete package

Digital's Windows NT server line is strengthened by a rich portfolio of integrated software, worldwide service and support, systems integration expertise, an excellent working relationship with Lotus, plus a tight alliance with Microsoft to satisfy all your Windows NT migration requirements.

Get all the details

For information on Lotus Notes on Digital's Windows NT server family, call 1-800-344-4825 (in the U.S. and Canada) and press 1. In all other locations worldwide, contact the Digital reseller nearest you. Or reach us on the World Wide Web at: **www.windowsnt.digital.com**

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digital™

Digital's computing platforms



digital

Discussion topics

- What are customers looking for?
- What are Digital's product strategy and offerings?
- Why are these better than the competition's?
- What can you look for in the future?

digital

What are customers looking for?

Performance

- Price/performance

Capacity

Reliability and Availability

- Access to data
- Ease of use

Investment Protection

- Flexibility
- Scalability
- Standards
- Compatibility

digital

Performance

> ***Digital excels at high-performance solutions that are easy to manage*** and customize because they consist of standard, off-the-shelf products. Digital puts it together, offering products with top price/performance that can perform the most challenging processing today and into the 21st century.
>
> **Syracuse University**
> **Northeast Parallel Architectures Center**

> First and foremost, we're looking for the best possible ***price/performance*** from a generalized set of tools and systems.
>
> **Ruben H. Donnelley, Corp.**

digital

Capacity

"As we begin implementing the SAP R/3 for integrated order management, we realize that we're going to have a very large database, in the many hundreds of gigabytes.

It's important that we're able to load a lot of that into memory. So a large amount of memory in the processor and a database that can support it become vital. With SAP and Digital and Oracle, we have the right solution."

Baxter Healthcare

digital

Reliability and Availability

"Our goal is to give subscribers the best value for their dollar. This goal challenges us to be on the leading edge in both cable delivery systems and information technology . . . ***the Digital environment is 100% reliable.***

Shaw Combinations, Inc.

With desktop access to worldwide information ***24 hours a day, 365 days a year***, we can respond quickly to customer requests . . . giving us a distinct competitive advantage.

Siliconix

Digital provides a platform to help us most and cost-effectively respond to these changes [in the pharmaceutical industry] by ***allowing us to give the right people access to the right information at the right time.***"

Astra Pharmaceuticals Pty. Ltd.

digital

Availability

"We're creating payment, security and authentication systems that allow companies to manage on-line transactions with customers using traditional payment instruments. OMI monitors its Merchant Server systems 24 hours a day, 7 days a week to ensure that stores are ***always open for business and secure from intrusion.***

Open Market, Inc.

Members now obtain ***information without delays***. We prepare statements in seconds that formerly took hours. Our operations have become more efficient, enabling us to achieve more . . .

Sprague Electric Credit Union

This level of power makes it possible for us to ***turn around answers faster***, and for us all to ask and to answer more detailed questions."

Corning, Inc.

digital

Investment Protection

"***Digital is unique in its depth of commitment to open, scaleable, distributed computing.*** Alpha systems span the desktop to the data center.

Chipcom Corp.

We chose the Alpha system because it provides us with several benefits. ***It's a versatile system*** . . .

GE Plastics, Structured Products Division

We noticed the machine had a SCSI connector, so I plugged in the tape drive we use for archiving, and it worked with no problems at all. You'd never know the difference between plugging a SCSI drive into an Intel box or plugging it into an Alpha. ***It's true plug-and-play technology.***"

MicroEdge Inc.

digital

Investment Protection

"By moving our business from a multi-million dollar mainframe to an Alpha platform, we'll realized a ***20-percent savings in overall IT costs. In less than two years this entire investment will have paid for itself.***

American Credit Indemnity

The shipping systems handles far more volume now that the open environment from Digital has replaced an IBM mainframe. And ***the Digital environment saves us $600,000 a year in mainframe usage and payroll.***"

The Limited Inc. – Distribution Services

digital

Scalability

"Digital's Alpha is a very strong architecture. Its ***scalability lets you multiply your systems performance as needed without incurring excessive costs.***

Great Plains Software

They tell me we may see 30 to 60% growth in the next year. And I'm comfortable that ***the Digital equipment can handle whatever happens.***"

Guaranteed Overnight Delivery, Inc.

digital

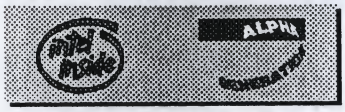
What are Digital's product strategy and offerings?

- The best of both worlds
- Full line of complementary Intel and Alpha products
- Intel-based PCs and servers
- Alpha-based workstations and servers
- The world's most robust clusters
- The most versatile storage

digital

Open client/server strategy

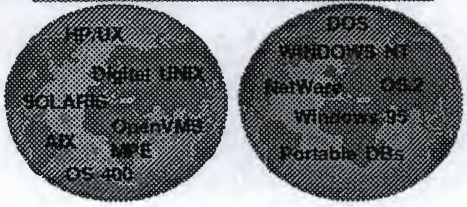
Using the best of both platforms . . .



PCI/Common Commodity Components and I/O

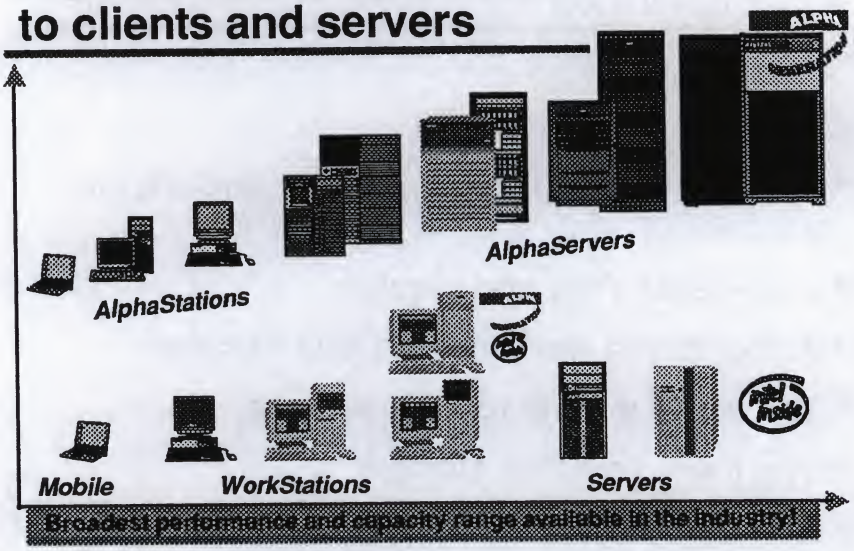
Common system platforms with Open PCI Bus

. . . to integrate the worlds of computing



digital

Digital's family approach to clients and servers



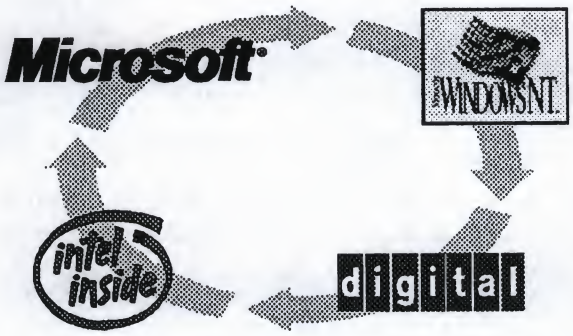
digital

Digital's Intel-based platform strategy

- Drive to meeting needs of business computing environment
 - Mobile, desktop, and server
 - Alliances to complement Digital's competencies
 - Product classes address business needs
 - Complement Alpha product line
- Core competencies matched with market needs
- Global business
- Excellence in execution
 - Top quality products

digital

Alliances



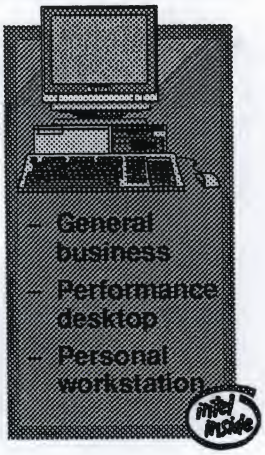
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Classes of products

Mobile



Client



Server



digital

What are customers saying?

Digital *ranks 8* in desktops with Fortune 1000. CRN/Gallop 3/95

Reliability and Availability

Investment Protection

Performance

Capacity

Complete range of PC client and server products that meet the needs of all my users and that fit seamlessly into my complex global network. Large Enterprise Customer

Digital offers me the ***latest and greatest products I need to make my business work*** together and they stand behind them with ***solid service*** and support, ***all delivered at the right price.*** Medium Sized Customer

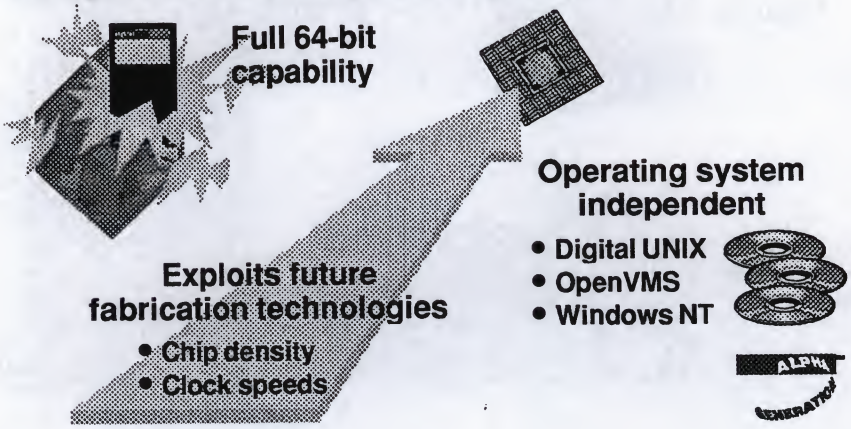
Their products have all the features I want. A Retail Consumer

#4 In PC Servers. IDC 9/95

digital

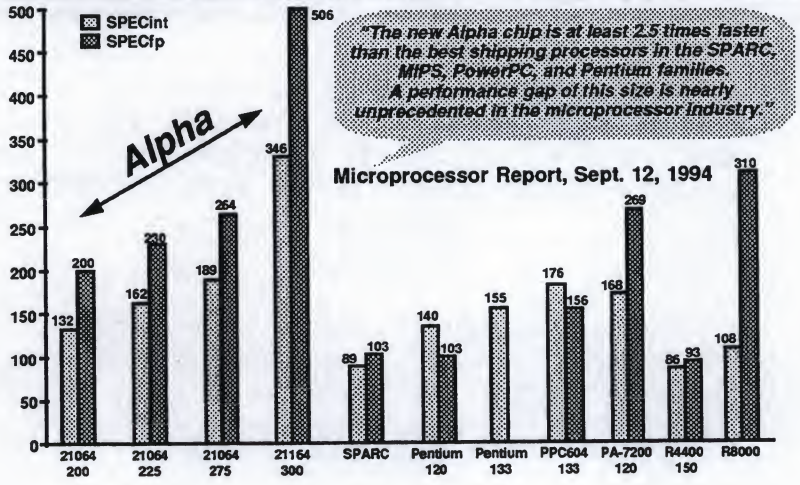
The Alpha architecture

Designed for scalability and longevity



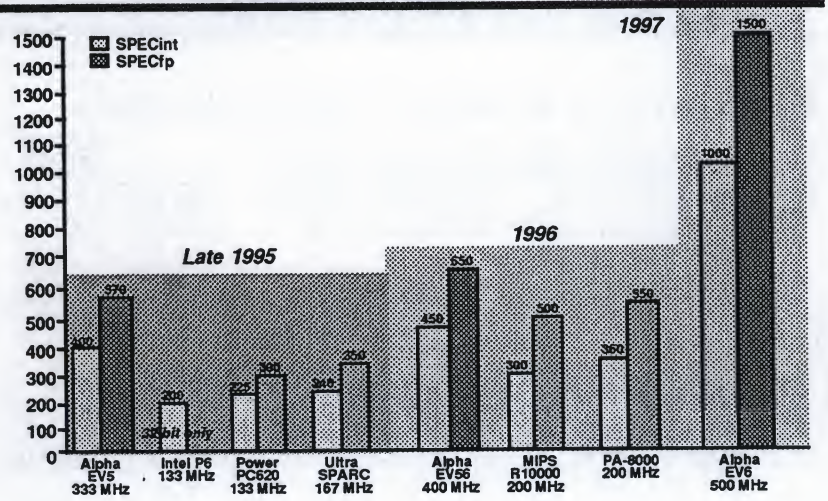
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Microprocessor comparison



digital

64-bit microprocessors



digital

64-bit microprocessors

". . . the x86 architecture has caught up with most of the RISC designs and, with the advent of the **P6**, poses a serious threat to all RISC manufacturers, ***with the exception of Digital and its Alpha processors***.

Dataquest
6/12/95

. . . we expect **UltraSPARC** systems, assuming they ship in 4Q95 at 167 MHz, to exceed all processors ***except the 21164*** in integer performance."

Microprocessor Report
5/30/95

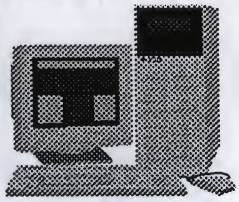
digital

Supercomputing on the desktop

Digital AlphaStation strategy

- **Focus on selected technical applications**

Best application performance at all price points



- **Targeted operating systems**
 - **UNIX**
 - **Windows NT**
 - **OpenVMS**

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Leadership applications

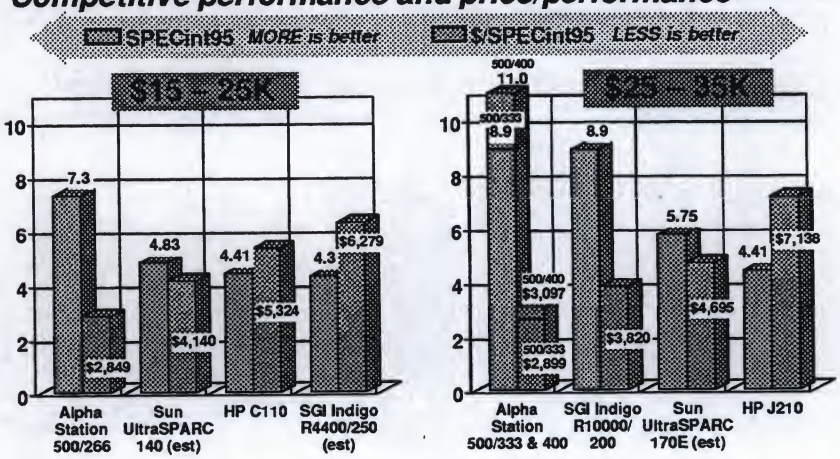
MDA	PTC, EDS/UG, Matra, Bentley, Autodesk, ComputerVision, MSC, ANSYS, HKSI
EDA	Mentor Graphics, Viewlogic, Synopsys
GIS	ESRI, Smallworld, ERDAS
S/W Dev	SEE-IT Alliance . . . Rational, Atria, Cadre, SQL, IDE, Frame, Interleaf
Science	Select portfolios in CFD, molecular modeling, computational chemistry, *etc.*

ALPHA GENERATION

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AlphaStations stay on top:
The most affordable workstations on earth!

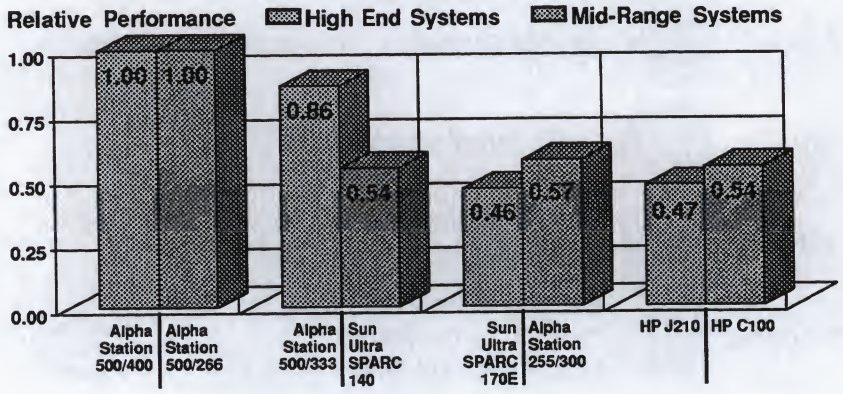
Competitive performance and price/performance



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Digital extends its commanding lead in applications performance

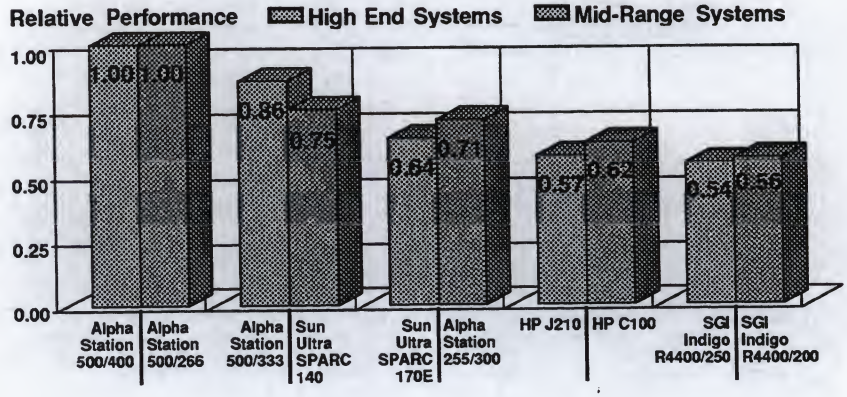
Mentor Graphics BoardStation V A.4



digital

Digital extends its commanding lead in applications performance

PTC Pro/ENGINEER V15



digital

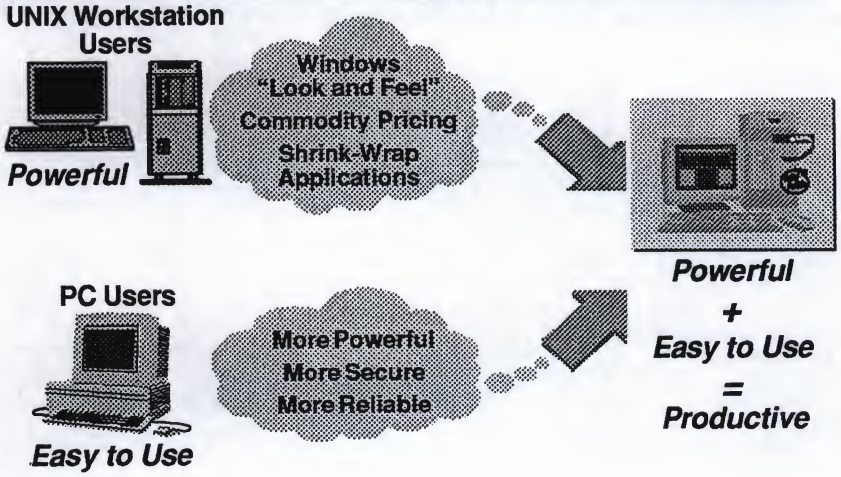
Line-up of PCI-based Alpha Workstations

	AlphaStation 200 4/166	AlphaStation 255/233	AlphaStation 255/300	AlphaStation 500/266	AlphaStation 500/333	AlphaStation 500/400	AlphaStation 600 5/266	AlphaStation 600 5/333
Enclosure	Desktop	Desktop	Desktop	Desktop	Desktop	Desktop	Deskside	Deskside
Alpha Chip	21064	21064A	21064A	21164	21164	21164A	21164	21164
Chip Speed	166 MHz	233 MHz	300 MHz	266 MHz	333 MHz	400 MHz	266 MHz	333 MHz
SPECint92	116.2	180	215	329	390	*480	329	412
SPECfp92	134.8	210	245	405	480	*600	405	545
SPECint95	2.31	3.8	4.5	7.3	8.9	*11	8.3	9.2
SPECfp95	3.22	5.1	5.7	10.5	11.6	*14	10.5	13.2
Slots	3	4	4	4	4	4	8	8

* Estimates

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The Windows NT personal workstation



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Premier platforms for client/server computing

Digital's AlphaServer strategy



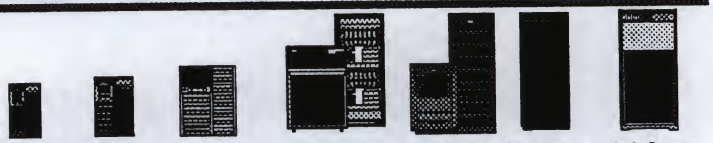
- **Compatible family of leadership open systems**
 - **Digital UNIX, OpenVMS, Windows NT Server**
- **Best balanced performance from desktop to datacenter**
- **Growth paths with investment protection in hardware and software**
- **Lowest cost of ownership**
- **Digital quality, reliability, service and support**

BEST server warranties in the industry

ALPHA GENERATION

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AlphaServer family



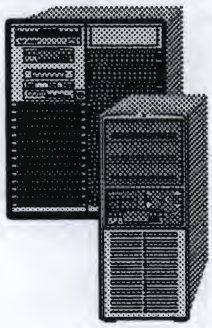
	AlphaServer 400	AlphaServer 1000A	AlphaServer 2000	AlphaServer 2100A & cab	AlphaServer 4100	AlphaServer 8200	AlphaServer 8400
Model	4/233, 4/166	4/266	4/275, 5/250, 5/300	4/275, 5/250, 5/300	5/300, 5/400	5/300, 5/350	5/300, 5/350, 5/440
Max. Disk (int/tl)	>17 GB 90 GB	>28 GB 440 GB	>34 GB 4 TB	>170 GB 4 TB	180 GB >7.5 TB	>160 GB >39 TB	>192 GB >39 TB
Max. I/O Bndwdth	132 MB/s	132 MB/s	132 MB/s	132 MB/s	500 MB/s	1,200 MB/s	1,200 MB/s
Max. SPEC(rate92)/f			13112/18802	24995/37926		50788/71286	91580/140571
tpmC @$/tpmC	–	1,153 @$229	–	3,194 @$196	6,059 @$223	–	11,456 @$286 11,014 @$222 30,390 @$305
Clusterable	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Internet pkg'd	Yes	Yes					

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Leadership performance with availability and value

AlphaServer as Internet server



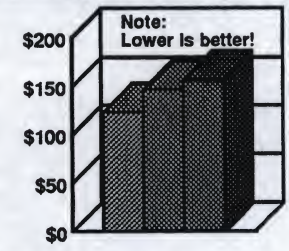
- **State of California**
 - Digital offers first-ever live election returns via the Internet – *Largest implemented Internet project*
- **University of Massachusetts**
 - Global electronic information clearinghouse for small businesses that is gathered from SBA, US Patent Office, IRS and other various government agencies
- **Time/Warner**
 - Sports Illustrated Swimsuit Photos on-line
- **City of Palo Alto**
 - The first on-line city
- **Future Fantasy Bookstore**
 - Small business goes global, 15-30% of sales now come over the Internet – *First on-line commerce project*

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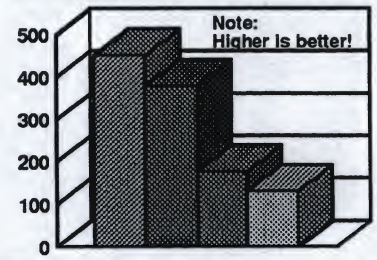
AIM results: AlphaServer 1000 4/266

Best price/sustained performance in its class!



AlphaServer 1000
Fujitsu-ICL Superserver J534i
Compaq ProLiant 4000

Outperforms the competition



AlphaServer 1000 4/266
Compaq ProLiant 4000 (3-Pentium/66)
Tricord DS1000/5100 (1 Pentium/100)
IBM RS/6000 POWERserver C10

ALPHA GENERATION

Source: AIM Technology UNIX System Price Performance Guide - Fall 1995

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Leadership performance with availability and value

AlphaServer 2100



- The SQL Server 6.0 reference platform
- LAN server
- SMP Database server
- Technical computation server
- Large mail server

Readers and Editors Pick
***DATAMATION* February 1, 1995**

digital

AlphaServer 8200 and 8400



Best Shared System
Multi-user
Peak Performance
for systems over $150,000

"The finest SMP system we've run ...we've run on almost all of them."
Lawrence Livermore National Labs

"Outperforms all competitors on large 3D post stack depth migration applications."
Landmark Graphics

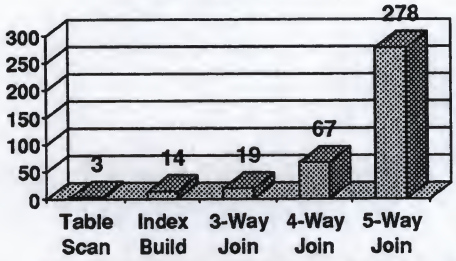
"Unequivocally declare that Digital has assumed the leadership role with Oracle in delivering Large-Scale, In-Memory Database technology."
Aberdeen Group

"The DBMS Manager's dream machine."
Datamation, PC

digital

Leadership performance with availability and value

AlphaServer 8400 with Very Large Memory



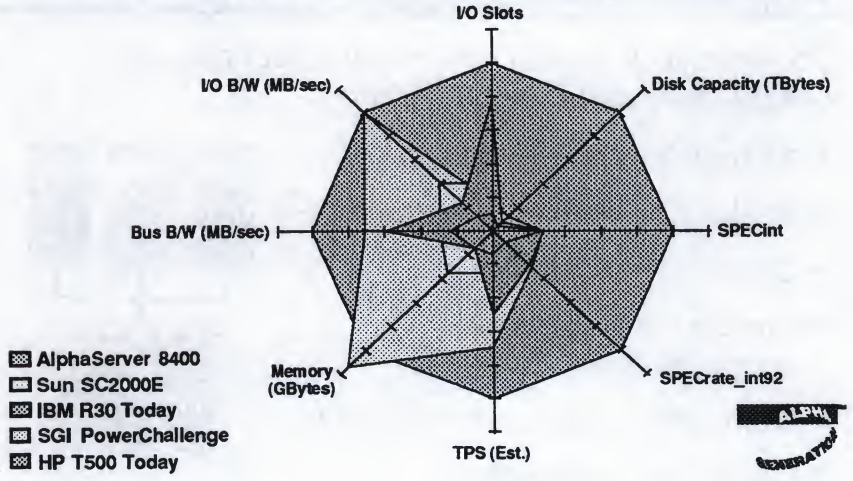
Demonstrated performance improvements are running standard Database software with *no application decomposition*

- **Balanced**
 - ✓ Very Large Memory
 - ✓ Symmetrical multiprocessing
 - ✓ CPU
- **Very large databases/data warehouse**
 - ✓ Oracle
 - ✓ Informix
 - ✓ Sybase
- **Simulations**
 - ✓ SAS
 - ✓ SAP
- **Vector analysis**

ALPHA GENERATION

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AlphaServer 8400 vs. combined competition



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AlphaServer summary

- Reliability
- Price/performance
- Scalability
- Growth path
- Processing power
- Premier cluster technology
- Choice
- Operating system interoperability

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Why clusters?

To meet your global information technology needs, now and into the future

- 24-hour system availability
- Scalability with easy growth
- Global shared data
- Simple management – single system view
- Complete system compatibility
- Complete connectivity



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What's a cluster?

Multi-node computer system

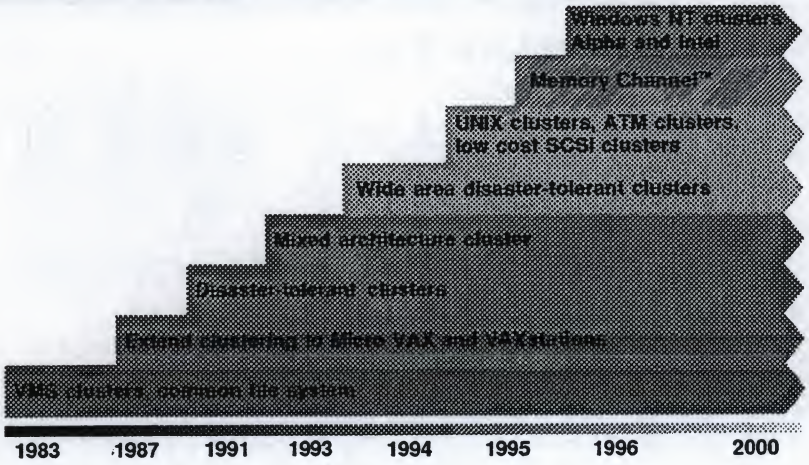
- **A single system view**
- **Available**
- **Cluster-wide system management**
- **Cluster-wide file system**
- **Easy scalability**
- **Flexible configuration**



As defined by *Aberdeen Group*

digital

Digital's clustering leadership

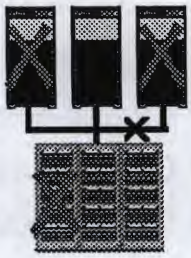


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Benefits of clusters

Reliable computing

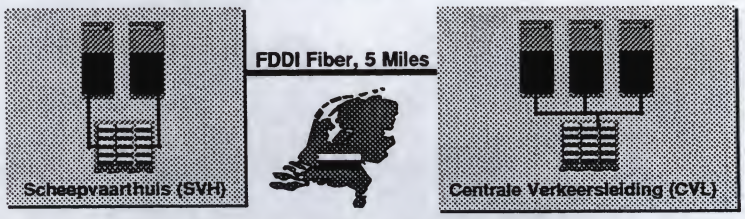
- *You never have to worry that your single system will fail*
- Clusters offer:
 - Increased *availability*
 - *Scalability*, with easy growth
 - *Easy management* as compared to multiple individual systems
 - *Compatible* with non-cluster systems



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Digital's clusters offer disaster-tolerant computing

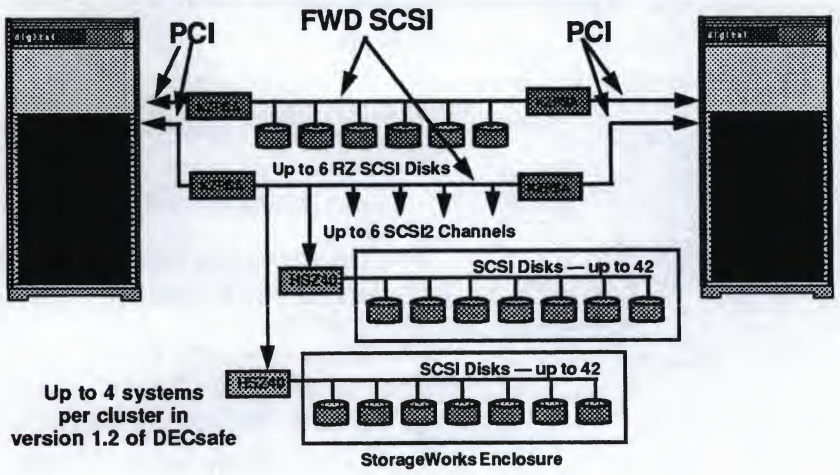
Who else is able to do this?



- Gemeentelijkvervoersbedrijf (GVB) runs Amsterdam's bus, metropolitan rail, and tramway systems
- Staff and transportation scheduling, financial admin (ROSS Systems), office automation (ALL-IN-1) for thousands of users
- On March 8th, 1994, at 10:00 a.m. SVH lost all power, including UPS
- *Continuous operation* was provided, with no user-perceived change

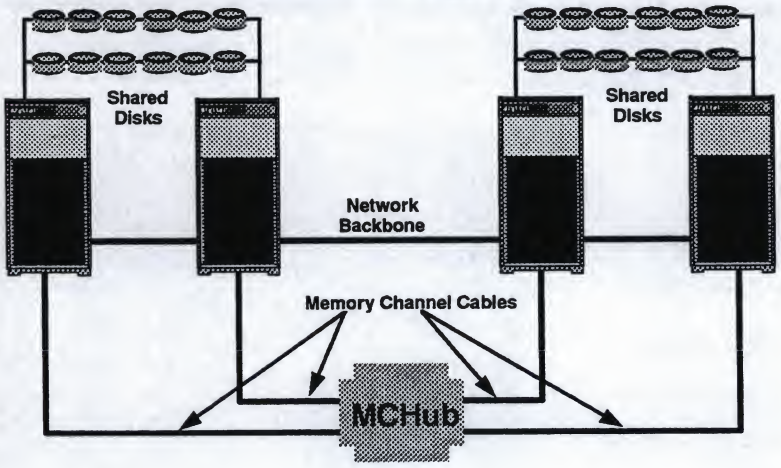
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DECsafe available server – today's UNIX cluster solution



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TruCluster solutions

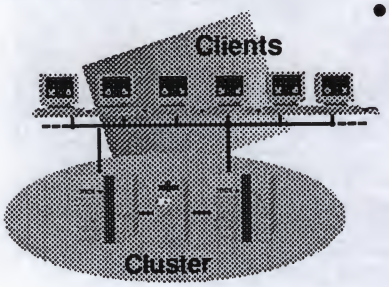


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Digital Clusters for Windows NT



The best high availability solution for Windows NT



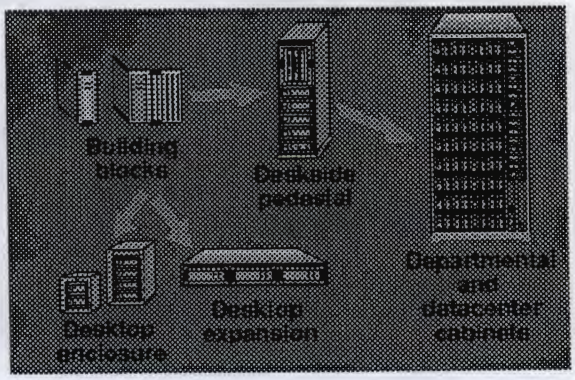
- Especially for client/server PC LANs
 - Layered software on Windows NT Server
 - For Windows & Mac clients
 - Benefits shrink-wrapped applications
 - Graphical management tools for easy administration
- For *2-Prioris or 2-Alpha* servers
- Off the shelf interconnect, storage

digital

StorageWorks™ The most versatile storage solution

Reliability and Availability | Capacity | Investment Protection

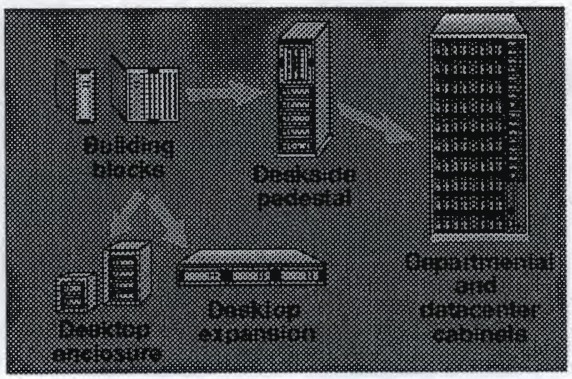
- Modular
- RAID
- Hardware
- Software
- Flexible
- Available
- Protective



digital

StorageWorks is for . . .

- Data centers, servers, LANs
- Open solution needs
- Expansion
- High performance
- Availability
- Sophisticated backup



digital

StorageWorks: Comprehensive

Storage to meet your needs whatever your . . .

Investment Protection

Operating systems

- For UNIX
- For OpenVMS
- For Windows NT
- For NetWare

Hardware

digital
HEWLETT PACKARD
Sun
IBM
Intel Inside

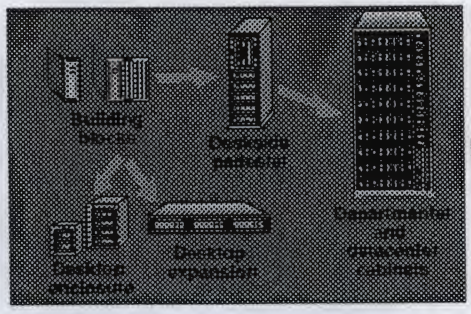
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StorageWorks: Just some of the building blocks

Tape drives

High capacity DLT

Disk drives



FDDI servers

DLT library

CD-ROM and optical jukeboxes

Enterprise/departmental backup

digital

What makes Digital better

	Digital	IBM	SGI	SUN	HP	Compaq
Performance	Best					
Services	✓	✓			✓	
Std Bus (>128MB/sec)	✓					
Cost of ownership	Best					
Warranty	Best					
Price/ performance	Best				✓	
Full 64-bit	✓		✓			
Choice of O/S on one platform	✓					
Commitment to Windows NT	✓					
Full clustering capability	✓					

digital

Only Digital offers

All of:

- **Worldwide service and support**
- **Standard I/O bus**
 - **and the *fastest* at 264mb/sec**
- **Best warranty**
- **Lowest total cost of ownership**
- **Best price/performance**
- **Full 64-bit processing power**
- **Choice of operating systems on one computer**

digital

Competition

Compared with SUN Microsystems

- **Digital's services are broader and deeper**
- **With Digital there are no migration issues**
 - **How many migrations will it take for SUN to get to where Digital is?**
- **Digital fully supports Windows NT**
 - **What's SUN's plan?**
- **Superior warranty**
- **Choice of operating system**

digital

Competition

Compared with IBM

- Digital is committed to Windows NT
 - What's IBM's commitment?
- With Digital there are no migration issues
 - How many migrations will it take for IBM to get to Digital's capabilities?
- Digital offers full open bus structure
 - How many proprietary busses does it take to work with IBM's systems?
- Common, industry standard bus

digital

Competition

Compared with HP

- Digital offers real clustering
 - Which we invented
- Digital is fully supporting Windows NT
 - What's HP's plan?
- Higher CPU performance
- Better warranty
- Lower cost of ownership
- 64-bit architecture NOW
- Standard, Open, PCI

digital

Competition

Compared with Compaq

- Superior flexibility
- Superior scalability
- Broader, deeper service
- Lower total cost of ownership and operation
- Closer relationship with Microsoft
- Ability to mix environments

digital

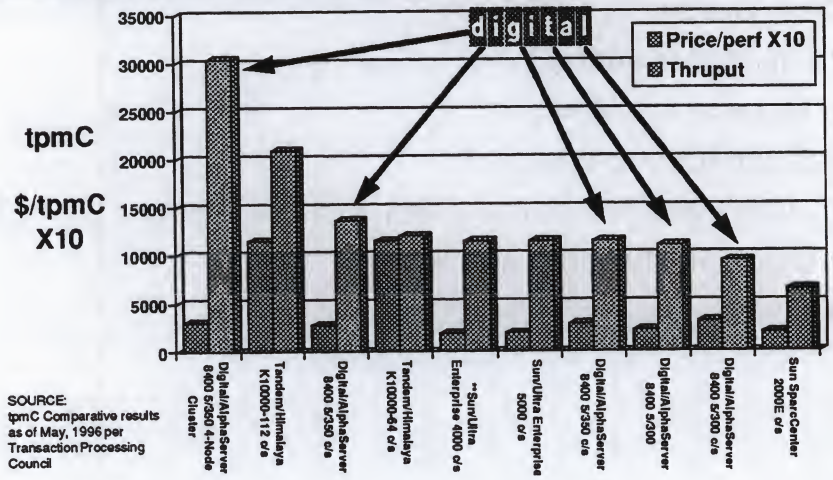
Competition

Compared with SGI

- Better warranty
- Better service
- Larger, more diversified applications library
- Superior portfolio: middleware and commercial applications
- Choice of operating system
- Superior, balanced CPU performance

digital

Top 10 TPC-C performers



SOURCE:
tpmC Comparative results as of May, 1996 per Transaction Processing Council

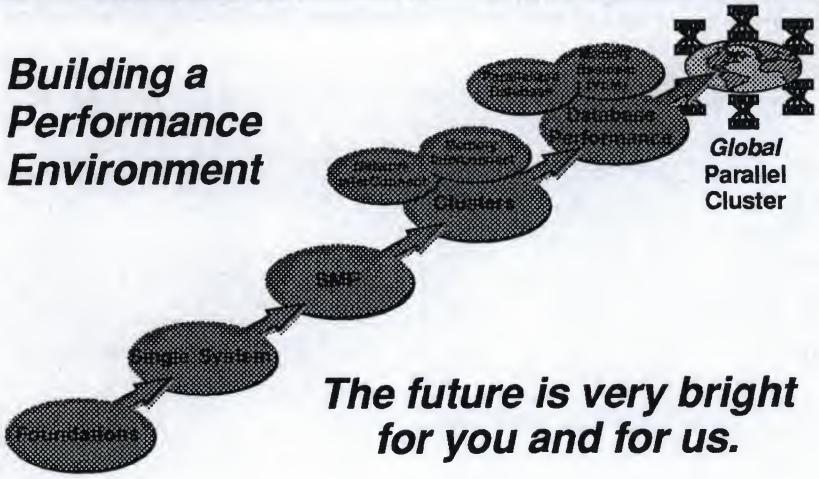
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Top 10 TPC-C performers

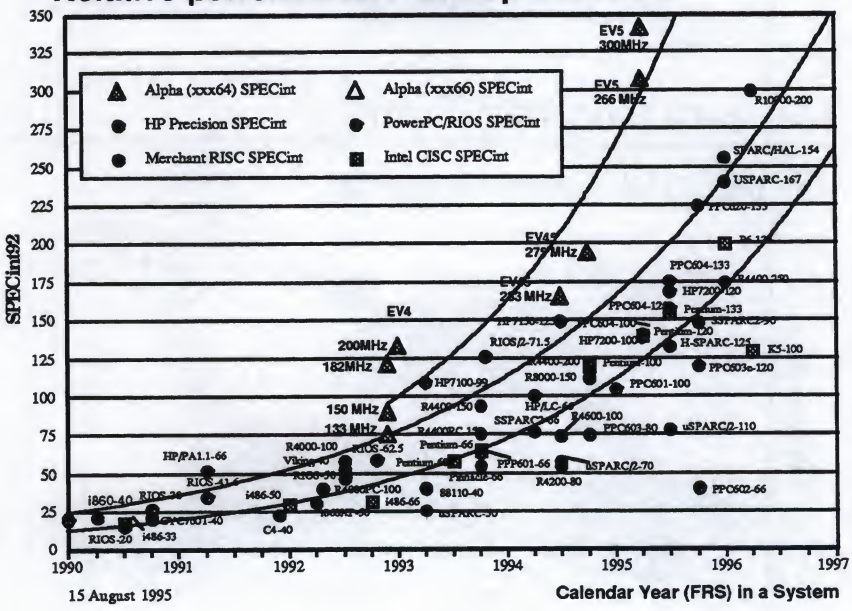
Rank	Company	Configuration	tpmc	$/tpmc	Database
2	Tandem	NonStop Himalaya K10000-112 c/s	20,918.03	$1,151	NonStop SQL/MP
4	Tandem	NonStop Himalaya K10000-64 c/s	12,021.47	$1,150	NonStop SQL/MP
8	SGI	Challenge XL Server (16 cpu) c/s	6,313.78	$479	Informix-OnLine
9	Tandem	Integrity NR/4435 Server 916 cpu) c/s	6,313.78	$493	Informix-OnLine
10	Siem/Nix	RM 600 Model 620 (16 cpu) c/s	6,269.67	$473	Informix-OnLine

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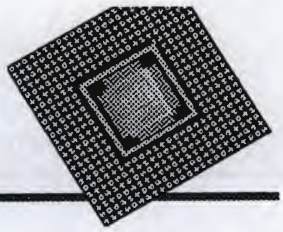
What can you look for in the future?



Relative performance: Microprocessors



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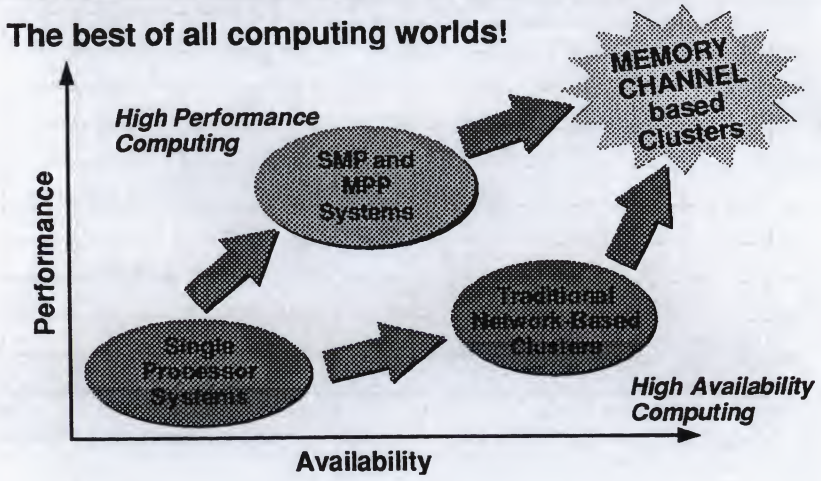
CMOS road map

	CMOS4	CMOS5	CMOS6	CMOS7	CMOS8
Year	1991	1994	1998	1999	2002
Chip	EV-4	EV-5	EV-6	EV-7	EV-8
Gate Speed	2.2	2.9	3.7	4.8	6.3
Min. Feature	.75 um	.5 um	.35 um	.25 um	.18 um
MHz	150	275	500	750	1 Ghz

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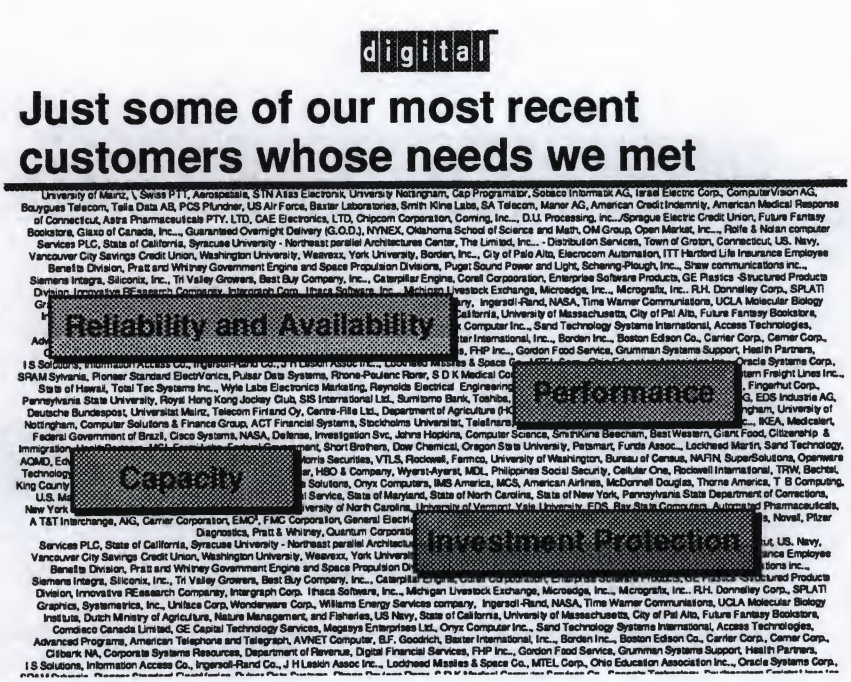
Memory Channel™ cluster

The best of all computing worlds!



digital

Just some of our most recent customers whose needs we met



digital™

Digital Equipment Corporation

© 1996

digital™

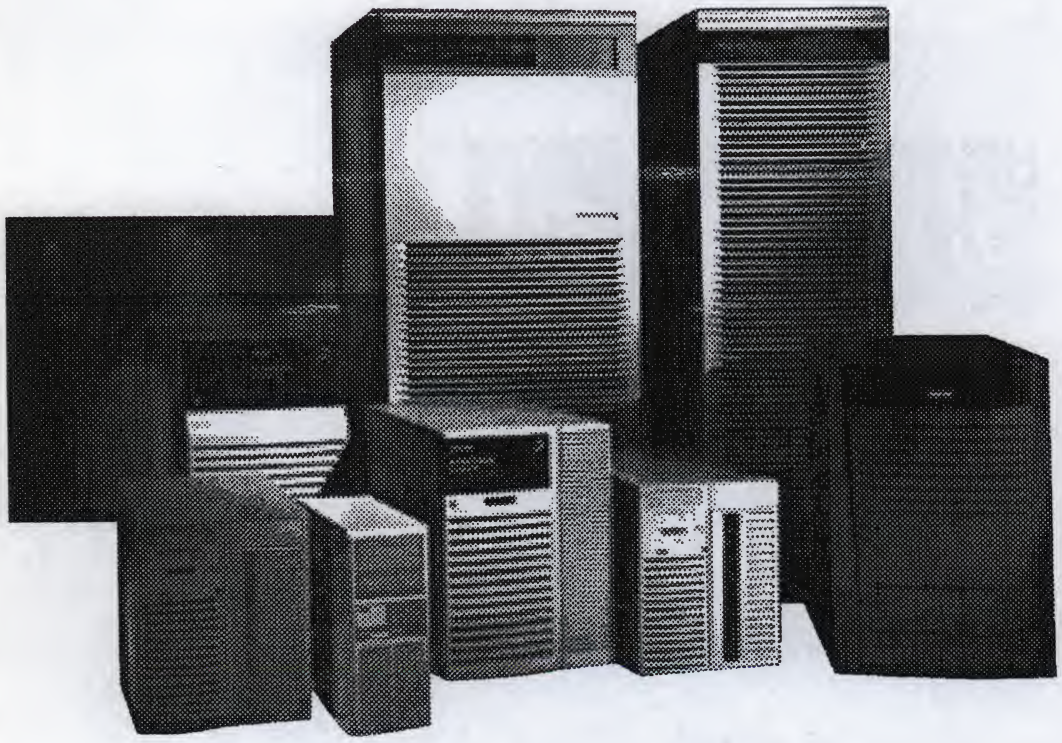
AlphaServer systems summary

A complete family of open systems with exceptional performance

ALPHA™ GENERATION

The AlphaServer family includes a complete range of systems, from workgroup to enterprise servers, all based on the same 64-bit RISC technology. You can bet your business on them.

The AlphaServer™ family: Where else can you find so many powerful, reliable systems in a single, compatible family? These systems give you the freedom to choose from several operating systems, thousands of applications, and a whole marketplace of industry-standard I/O devices.



AlphaServer systems at a glance

- Industry-leading performance and price/performance.
- Industry-standard PCI, ISA, and EISA slots let you connect the inexpensive, commodity devices that work best for your needs.
- Hardware warranty for AlphaServer systems — the best in the industry for RISC-based systems.
- Choice of operating system: Digital™ UNIX® for the most standards-compliant UNIX operating system in the industry; OpenVMS™ for exceptional business-critical computing; Windows NT™ for unprecedented Microsoft® Windows® power and performance.

Imagine solutions that offer enduring value and that work for today and tomorrow... technology that opens the way for innovation by enabling you to take advantage of totally new ways of computing... from Internet to three-dimensional applications, and access to data across systems, networks... and continents.

June 1996

AlphaServer comparison chart







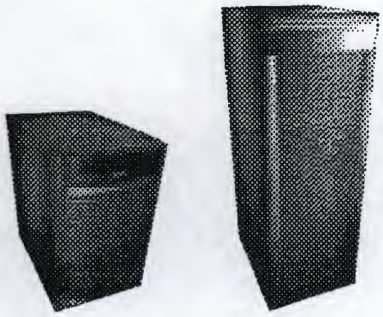
System	AlphaServer 400 4/233 Workgroup Server (Also available in Internet configurations)	AlphaServer 1000 4/266, 1000A 4/233 and 4/266 Workgroup Servers (Also available in Internet configurations)		
CPU features		1000 4/266	1000A 4/233	1000A 4/266
Number of processors	1	1	1	1
CPU/clock speed	21064A/233 MHz	21064A/266 MHz	21064A/233	21064A/266
Cache size (on chip/on board)	8 KB I-cache, 8 KB D-cache/512 KB	16 KB I-cache, 16 KB D-cache/2 MB		
In-cabinet CPU upgrade	Yes	Yes	Yes	Yes
Performance				
tpmC @ $/tpmC*	—	1,153 @ $229	—	—
SPECint92*/SPECint95*	161.0	197.5/4.34	165.3	197.5/4.34
SPECfp92*/SPECfp95*	194.3	263.8/6.03	222.9	263.8/6.03
SPECfp95 SMP	—	—	—	—
SPECrate_int92*/SPECint_rate95*	3,885	4,921/39	3,989	4,921/39
SPECrate_fp92*/SPECfp_rate95*	4,606	6,283/54.3	5,356	6,283/54.3
LINPACK 1000 x 1000 (DP MFLOPS)	138.4	193.2	169.0	193.2
I/O features				
Maximum memory	384 MB	1 GB		
Maximum disk capacity (in cabinet/total)	17.2 GB/90 GB	28 GB/440 GB		
Maximum I/O bandwidth	132 MB/s	132 MB/s		
I/O support (maximum configuration)	2 PCI slots, 3 ISA slots, 1 PCI/ISA slot, FWD SCSI-2, Ethernet, FDDI, Token Ring, RAID, synch. comm.	1000A: 7 PCI slots, 2 EISA slots, (1000: 2 PCI slots, 7 EISA slots, 1 PCI/EISA slot), FWD SCSI-2, RAID, Ethernet, FDDI, synch. comm., DSSI,™ Prestoserve,* Token Ring		
Reliability/high availability features				
OpenVMS Cluster	Ethernet, FDDI, SCSI	Ethernet, DSSI, FDDI, SCSI		
UNIX Clusters (Digital UNIX)	DECsafe™ ASE, Parallel Software Environment	DECsafe ASE, Parallel Software Environment (1000A: PCI Memory Channel)		
Digital Clusters for Windows NT	Yes/Yes	Yes	Yes	Yes
High availability features	Auto reboot, system management, optional external disk hot swap, memory failover, error logging, optional uninterruptible power supply (UPS)	Auto reboot, thermal management, optional redundant power system, remote system management, RAID, disk hot swap, dual SCSI backplane, memory failover, ECC memory, ECC cache, error logging, optional uninterruptible power supply (UPS)		
Storage				
	StorageWorks™	StorageWorks		
Software features				
Operating systems	Digital UNIX, OpenVMS, Windows NT	Digital UNIX, OpenVMS, Windows NT		

Individual workloads should be carefully evaluated before making performance estimates for specific applications.
In this chart, no warranty of system performance is expressed or implied. Details on configurations are found in the *Digital Systems and Options Catalog*.
Features may differ among operating environments. Performance may vary depending on configuration, application, and operating environment.





AlphaServer 2000 4/275, 5/250 and 5/300 Workgroup Servers			AlphaServer 2100A, 4/275, 5/250 and 5/300 Departmental Servers (Also available in cabinet configurations)		
4/275	5/250	5/300	4/275	5/250	5/300
Up to 2	Up to 2	Up to 2	Up to 4	Up to 4	Up to 4
21064/275 MHz	21164/250 MHz	21164/291 MHz	21064/275 MHz	21164/250 MHz	21164/291 MHz
16 KB I-cache, 16 KB D-cache/ 4 MB per processor	8 KB I-cache, 8 KB D-cache 96 KB combined/ 4 MB per processor	8 KB I-cache, 8 KB D-cache 96 KB combined/ 4 MB per processor	16 KB I-cache, 16 KB D-cache/ 4 MB per processor	8 KB I-cache, 8 KB D-cache 96 KB combined/ 4 MB per processor	8 KB I-cache 8 KB D-cache 96 KB combined/ 4 MB per processor
Yes	Yes	Yes	Yes	Yes	Yes
—	—	—	—	—	Available under NDA
202.9	277.1	319.3	202.9	277.1/5.96	319.3/8.02
292.6	410.4	477.3	292.6	410.4/8.39	477.3/9.64
—	—	—	—	—	—
Up to 9,423	Up to 13,112/108	Up to 15,164/125	Up to 18,036	Up to 24,996/210	Up to 26,510/246
Up to 13,242	Up to 18,802/139	Up to 23,176/161	Up to 25,997	Up to 37,926/216	Up to 44,405/251
Up to 347.9	Up to 578.3	Up to 663.5	Up to 642.7	Up to 1,022.0	Up to 1,090
1 GB			2 GB (1 GB for 4-CPU model)		
34.4 GB/Up to 4 TB			Pedestal: 69 GB/Up to 4 TB Cabinet: 270 GB/650 GB		
132 MB/s			132 MB/s		
3 PCI slots, 7 EISA slots, RAID, Ethernet, FDDI, synch. comm., FWD SCSI-2, DSSI, CI: (OpenVMS), Prestoserve, Token Ring			2100A: 8 PCI slots, 3 EISA slots, (2100: 3 PCI slots, 8 EISA slots), RAID, Ethernet, FDDI, DSSI, CI: (OpenVMS) synch. comm., FWD SCSI-2, DSSI, Prestoserve, Token Ring, ATM		
Ethernet, DSSI, FDDI, SCSI,CI			Ethernet, DSSI, FDDI, SCSI, CI		
TruCluster solutions, DECsafe ASE, Parallel Software Environment (with PCI Memory Channel)			TruCluster solutions, DECsafe ASE, Parallel Software Environment (with PCI Memory Channel)		
Yes	Yes	Yes	Yes	Yes	Yes
Auto reboot, thermal management, optional redundant power system, remote system management, RAID, disk hot swap, memory failover, ECC memory, ECC cache, SMP CPU failover, error logging, optional uninterruptible power supply (UPS)			Auto reboot, thermal management, optional redundant power system, remote system management, RAID, disk hot swap, memory failover, ECC memory, ECC cache, SMP CPU failover, error logging, optional uninterruptible power supply (UPS). Also with CAB: multiple systems, multiple power sources, dual-ported storage, optional integrated UPS		
StorageWorks			StorageWorks		
Digital UNIX, OpenVMS, Windows NT			Digital UNIX, OpenVMS, Windows NT		





AlphaServer 4100 5/300E, 5/300 and 5/400 High-End Departmental Servers

AlphaServer 8200 5/300, 5/350, and 5/440 Enterprise Servers

5/300E	5/300	5/400[1]	5/300	5/350	5/440[1]
Up to 4	Up to 4	Up to 4	Up to 6	Up to 6	Up to 6
21164/300 MHz	21164/300 MHz	21164A/400 MHz	21164/300 MHz	21164/350 MHz	21164A/437 MHz
8 KB I-cache, 8 KB D-cache, 96 KB secondary	8 KB I-cache, 8 KB D-cache, 96 KB secondary, 2 MB per processor	8 KB I-cache, 8 KB D-cache, 96 KB secondary, 4 MB per processor	8 KB I-cache, 8 KB D-cache, 96 KB combined/4 MB per processor		
Yes	Yes	Yes	Yes	Yes	Yes
—	—	6056.04 @ $223	—	7426 @ $235	—
—/7.15	—/8.11	—/12e	341.4/7.43	432.8/10.1	—
—/12.0	—/12.7	—/17e	512.9/12.4	602.2/14.2	—
18.4[2]	21.8[2]	29e[2]	—	31.4[4]	34e[4]
—/216	—/278	—/367e	Up to 50,788/388	Up to 65,842/506	/590e
—/243	—/303	—/397e	Up to 71,286/420	Up to 84,561/505	/550e
831	1,325	1,712	Up to 2,445[5]	Up to 2,817[5]	Up to 3,180e
4 GB			6 GB		
Pedestal: 90 GB/Over 7.5 TB[3] Cabinet: 180 GB/Over 7.5 TB[3]			160 GB/Over 39 TB		
500 MB/s			1.2 GB/s		
8 64-bit PCI slots (including 3 shared PCI/EISA slots), RAID, Ethernet, Fast Ethernet, FDDI, CI,[1] (OpenVMS) synch. comm., FWD SCSI-2, DSSI, Prestoserve, Token Ring, ATM[1] NOTE: 64-bit PCI slots will accept and improve performance of 32-bit PCI options.			132 PCI slots, 8 EISA slots, Ethernet, FDDI, Token Ring, synch. and async. comm., CI, FWD SCSI-2, RAID, DSSI, Prestoserve, HiPPI, Fibrechannel, IPI, ATM, mainframe channel connect		
Ethernet, DSSI, FDDI, SCSI, CI			Ethernet, DSSI, FDDI, CI		
TruCluster solutions[1], DECsafe ASE, Parallel Software Environment (with PCI Memory Channel[1])			TruCluster solutions, DECsafe ASE, Parallel Software Environment (with PCI Memory Channel)		
Yes	Yes	Yes	—	—	—
Auto reboot, thermal management, optional redundant power system, remote system management, RAID, disk hot swap, memory failover, ECC memory, ECC cache, ECC system bus, SMP CPU failover, error logging, optional uninterruptible power supply (UPS). Also with CAB: multiple systems, multiple power sources, dual-ported storage			Auto reboot, thermal management, optional redundant power system, remote system management, RAID, disk hot swap, memory failover, ECC memory, ECC cache, SMP CPU failover, error logging, optional uninterruptible power supply (UPS)		
StorageWorks			StorageWorks		
Digital UNIX, OpenVMS, Windows NT			Digital UNIX, OpenVMS		

[1]Available Q3 calendar 1996 [2]Four CPUs [3]Using HSZ40 external arrays and 4.3 GB drives [4]Six CPUs [5]LINPACK NxN



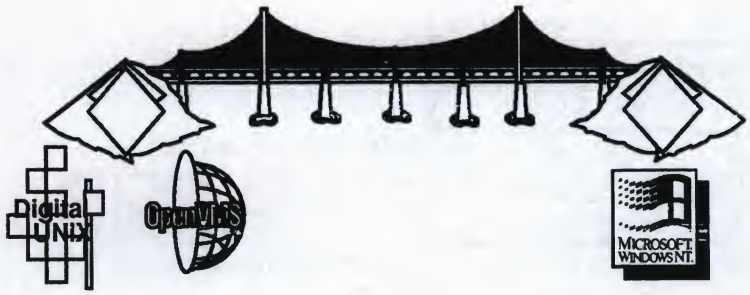
AlphaServer 8400 5/300, 5/350, and 5/440 Enterprise Servers

5/300	5/350	5/440[1]	System
			CPU features
Up to 12	Up to 12	Up to 12	Number of processors
21164/300 MHz	21164/350 MHz	21164A/437 MHz	CPU/clock speed
8 KB I-cache, 8 KB D-cache, 96 KB combined/4 MB per processor			Cache size (on chip/on board)
Yes	Yes	Yes	In-cabinet CPU upgrade
			Performance
11,014 @ $202	14,227 @ $269[7]	—	tpmC @ $/tpmC®
341.4/7.43	432.8/10.1	—	SPECint92®/SPECint95®
512.9/12.4	602.2/14.2	—	SPECfp92®/SPECfp95®
—	38.5[6]	/42e[4]	SPECfp95 SMP
Up to 91,580/767	Up to 115,878/1004	/1170e	SPECrate_int92®/SPECint_rate95®
Up to 140,571/919	Up to 168,159/1039	/1140e	SPECrate_fp92®/SPECfp_rate95®
Up to 4,996[5]	Up to 5,904[5]	Up to 6670e[5]	LINPACK 1000 x 1000 (DP MFLOPS)
			I/O features
14 GB			Maximum memory
192 GB/Over 39 TB			Maximum disk capacity (in cabinet/total)
1.2 GB/s			Maximum I/O bandwidth
144 PCI slots, 8 EISA, XMI, Futurebus+, CI, Ethernet, FDDI, Token Ring, synch. and async. comm., Fast SCSI-2, FWD SCSI-2, RAID, DSSI, Prestoserve, HiPPI, Fibrechannel, IPI, ATM, mainframe channel connect			I/O support (maximum configuration)
			Reliability/high availability features
Ethernet, DSSI, FDDI, CI			OpenVMS Cluster
TruCluster solutions, DECsafe ASE, Parallel Software Environment (with PCI Memory Channel)			UNIX Clusters (Digital UNIX)
—	—	—	Digital Clusters for Windows NT
Auto reboot, thermal management, optional redundant power system, remote system management, RAID, disk hot swap, memory failover, ECC memory, ECC cache, SMP CPU failover, error logging, optional uninterruptible power supply (UPS)			High availability features
			Storage
StorageWorks	StorageWorks		
			Software features
Digital UNIX, OpenVMS			Operating systems

[4]Eight CPUs [7]30,390 @ $305 in a TruCluster

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The Windows NT Integration Across the Enterprise Program



August 1996

digital

The IT Challenge:
Effective Interoperability

Bringing Windows NT into the Enterprise



- **Implement**
 common hardware platforms across multiple O/S environments
- **Develop and Deploy**
 distributed, cross-platform, client/server applications
- **Share information**
 between different systems
- **Manage** ***distributed systems & networks***
- **Service & Support**
 diverse environments

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The Windows NT Integration Across the Enterprise Program

Integrates Windows NT with Digital UNIX

A Program to make Enterprise IT Investments Work:

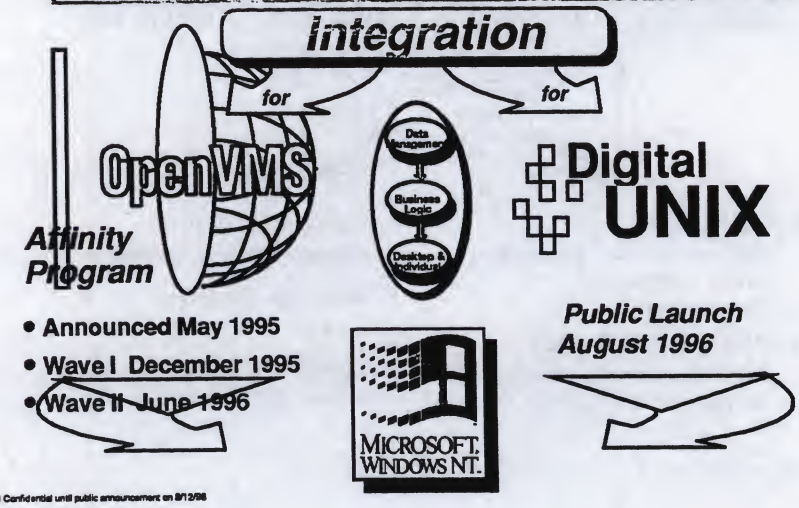
- **Effective Interoperability**
 between Windows NT & UNIX & OpenVMS
- **Service and Support**
 for interoperability between Windows NT & UNIX & OpenVMS delivered worldwide by Digital & key partners
- **Building on Success**
 of the OpenVMS Affinity Program and the Microsoft Alliance for Enterprise Computing

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The Windows NT Integration in the Enterprise Program



- Announced May 1995
- Wave I December 1995
- Wave II June 1996

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Integration for OpenVMS Formerly Known as Affinity

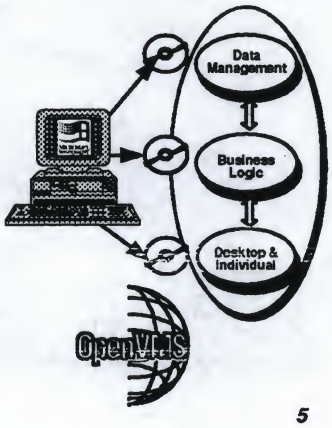
Combines the Strengths of Windows NT and OpenVMS

1 *Provides* ***Unlimited high-end*** *for Windows with OpenVMS bet-your-business functionality*

2 ***Seamlessly integrate*** *OpenVMS with Windows NT and its application availability*

3 *Provide* ***Windows NT-based*** *application development & system management*

4 *Using* ***Vendor-Independent*** *networks & middleware*



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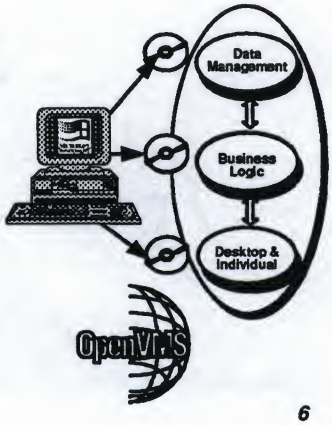
Integration for OpenVMS Wave 1 & 2 Summary

1 ***Unlimited high end*** - **64-bit OpenVMS V7.0**
- 64 bits for VLM and VLDB with Oracle Rdb7 and Oracle 7
- OpenVMS Rdb7 Best Single System SMP Performance
- 64-bit Spiralog for huge capacity and continuous backup

2 ***Seamlessly integrate - Mission-critical Software***
- ACMSxp and RTR: Windows NT and OpenVMS
- WWW access to exisiting & new OpenVMS environments
- Systems Integration Services from Digtal and Partners

3 ***Windows NT-based - Digital & Partners***
- 60+ Leading Software Partners
- 11 new Application Development Partners
- Windows NT-based Management tools

4 ***Vendor Independent***
- Network transport independence, DCE on Windows NT
- WIN32 APIs, MFC, OLE
- ObjectBroker, DCE, DECmessageQ, DCOM

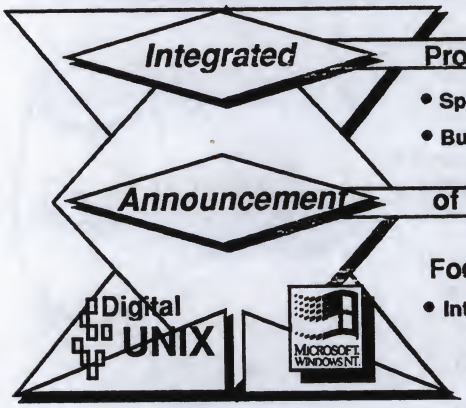


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Integration for Digital UNIX:
What We're Announcing



Program for Windows NT

- Spanning OpenVMS and Digital UNIX
- Building on the Affinity Program

of Windows NT Integration for Digital UNIX

Focus on Asset Protection for

- Interoperability — Data, applications, internet, messaging, system and network management
- Software development — Middleware, code migration, common development tools

of PATHWORKS V6.0:

Advanced Server for UNIX plus NetWare

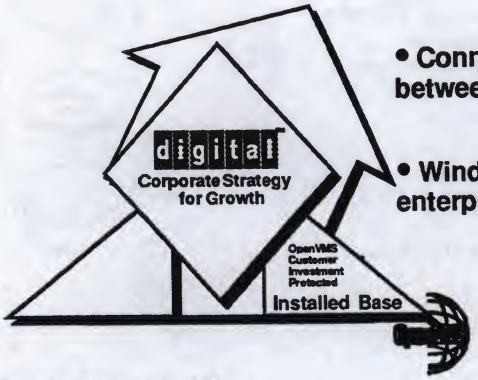
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Integration: an Integral Part of
Digital's Overall Strategy

- High performance 64-bit enterprise computing — Digital UNIX
- Connectivity within and between enterprises — *Internet & Intranet*
- Windows NT across the enterprise — MICROSOFT WINDOWS NT



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Digital UNIX Strategies & Differentiators

Focus *on markets which exploit 64-bit high performance computing*

Partner *for* Strategic Alliances Applications

Provide

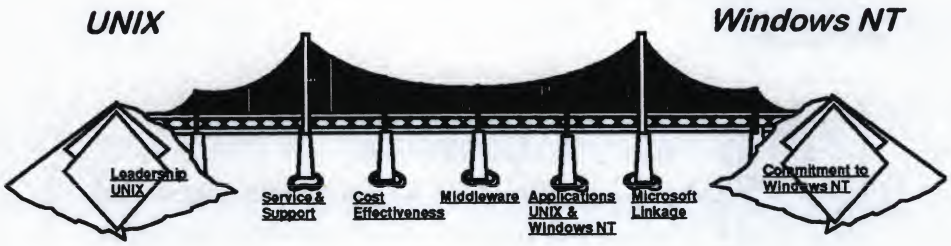
- Migration safe, 64-bit enterprise scalability
- Breakthrough performance via VLM & TruCluster capability
- Microsoft Connectivity in the mid-tier via leadership middleware and key software partnerships
- Unmatched Availability, Affordability & Performance with TruCluster Solutions
- High performance 64-bit Intranet/Internet servers -- AltaVista

Digital UNIX

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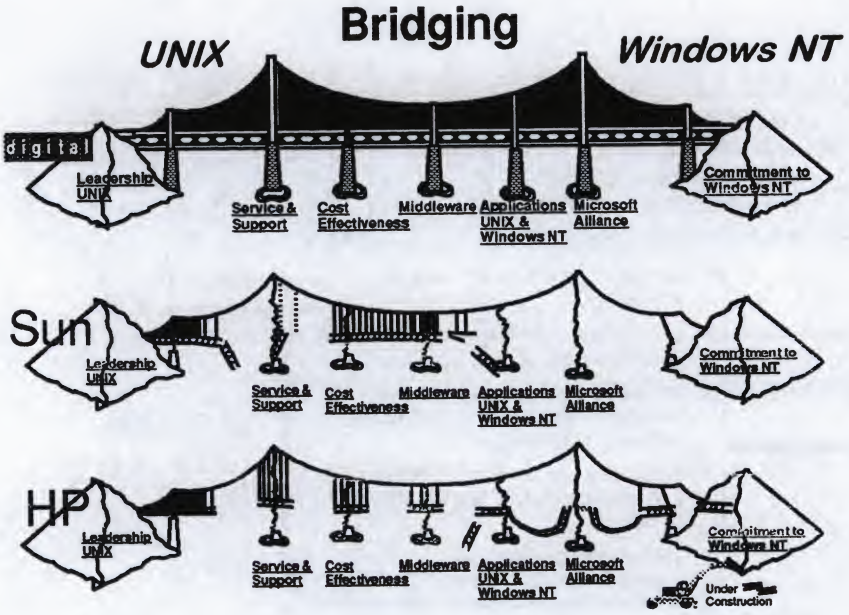
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Bridging UNIX & Windows NT

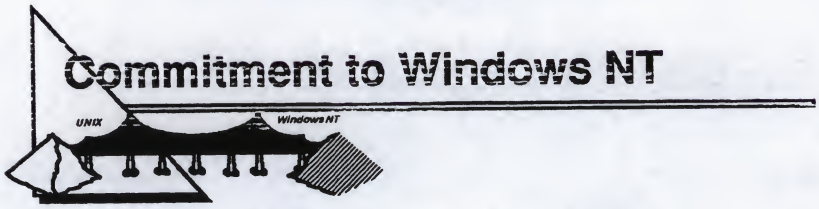


Requirements for Passage

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MICROSOFT. WINDOWS NT.

- First RISC Windows NT platform: 1992
- Most scalable Windows NT
- Dedicated Windows NT organization since 1993
- Committed to Windows NT on both Intel & Alpha
- Added-value Windows NT Clustering
- Unparalled Windows NT service capability

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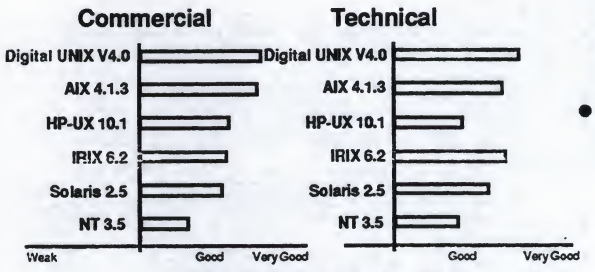
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Leadership UNIX



Digital UNIX

- First 64-bit UNIX
- First UNIX95 Branded
- Brought VLM and its breakthrough performance to the market
- Leadership Clustering



Source: Systems Software D.H.-Brown 3/96

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Service & Support



MICROSOFT WINDOWS NT

- Digital's Global Multivendor Service:
 Over 100 Countries serving 1300 vendors
- Comprehensive systems integration services and partners
- Microsoft-certified professionals
 More than HP & Sun combined (over 1,000 today)
- Microsoft Expertise Centers
 - Enterprise Solutions Center for Windows,
 - *Bellevue, WA & Valbonne, France*
 - Integrated Solution Centers

Americas	9
Europe	15
Asia Pacific	5

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Cost Effectiveness



The Platform Advantage

No UNIX Migrations to 64 bits

Resources dedicated to new application services not conversion activities

Unmatched Scalability UNIX & WNT

Graceful cost-effective growth

	Digital	Others
Scalability		
Windows NT on Intel	○	○
Windows NT High-Performance RISC	○	○
UNIX High-Performance RISC	○	○
Performance		
UNIX	○	○
UNIX 64-bit Barrier-Breaking Performance	○	○
Windows NT Enterprise Application Capability	○	○
Flexibilility		
UNIX platform	○	○
Windows NT platform	○	○
Single Platform for UNIX & Windows NT	○	○
Availability		
High Availability UNIX Clustering	○	○
High Availability Windows NT Clustering	○	○
Proven Clustering Expertise	○	○

Legend
○ Yes
○ Partial
○ No

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Middleware: Only Digital Supplies all Middleware on both UNIX and Windows NT



The Middleware Advantage

The glue between the Client/Server layers:

- **Communication from layer to layer**
- **Insulation of applications from issues of heterogeneous environments**

	Digital	Others
Objects: Object Broker		
Wrappers Applications & data	○	○
Supports DCOM & CORBA	○	○
Enables objects to be used anywhere	○	○
DCE		
Full UNIX implementation	○	○
Full Windows NT implementation	○	○
Message Queuing		
Guaranteed message delivery capability	○	○
High Speed Message Q capability (for HP)	○	○
WAN Transaction Fail-over		
Guaranteed message delivery capability	○	○
Support for a variety of TP monitors	○	○
TP Solutions		
Mainframe Compatibility	○	○
TP over the Internet	○	○

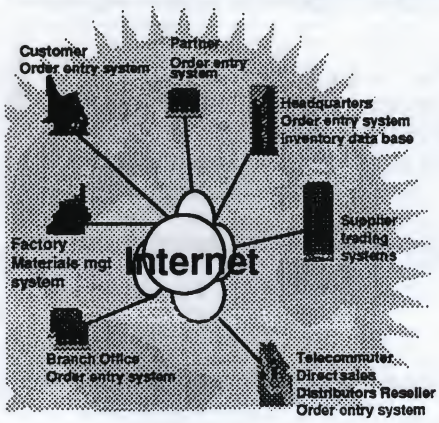
Legend
○ Yes
○ Partial
○ No

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Digital UNIX & Windows NT for Internet



A complete Internet software solution on both UNIX & Windows NT

- **Base servers:** Digital Internet AlphaServer, Netscape server
- **Browsers:** Microsoft Explorer, Netscape Navigator, SpyGlass, others
- **Search engine:** Digital AltaVista Search Engine
- **Collaboration software:** AltaVista Forum
- **Security:** AltaVista Tunnel and Firewall

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Integrated Messaging

UNIX orientation		*Windows NT orientation*
X.400 mail backbone X.500 directory srvc.	Data Management	X.400 mail backbone X.500 directory srvc.
Internet Mail (SMTP)	Business Logic	Microsoft Exchange
Exchange, Lotus Notes	Desktop & Individual	Microsoft Exchange

- **UNIX to Windows NT integration supported by Internet connectors on both Exchange and Lotus Notes**
- **Digital recommends MailWorks X.400 and X.500 for more complex installations, or where increased manageability is desired**

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Digital Middleware Gives Rolfe and Nolan Customers Increased Flexibility

"We use Reliable Transaction Router (RTR) from Digital as reliable middleware in a true multiplatform environment, connecting systems running under OpenVMS, Digital UNIX and SUN Solaris. The proven quality of RTR supports our decision to port "The Lighthouse System" to the Windows NT platform, knowing that RTR will handle the reliable Windows NT to UNIX connection."

Chris Cotton
Development Strategy Manager,
Rolfe and Nolan
June 10, 1996

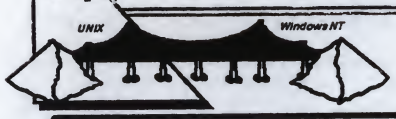
Quality middleware from Digital allows Rolfe and Nolan to offer their customers:

- **Choice of UNIX or Windows NT platforms**
- **Proven reliability**

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Applications for both UNIX & Windows NT



What does it take
to cover application assets while incorporating new platforms...?

Protecting existing applications
Expanding existing applications
Providing new applications

It takes ...
- ***Common platform for both environments***
- ***A leadership solution set today, providing interoperability*** between UNIX & Windows NT

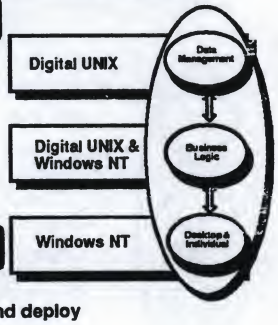
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Applications: Expanding Access to Existing Applications

Protecting & Sharing Assets (non-intrusive)

- UNIX desktops access Windows NT applications via multiuser, X-enabled Windows NT servers (Insignia, NCD)
- Windows NT desktops access UNIX applications via X-server for Windows NT (Hummingbird, Intergraph, NetManage, NCD, WRQ)



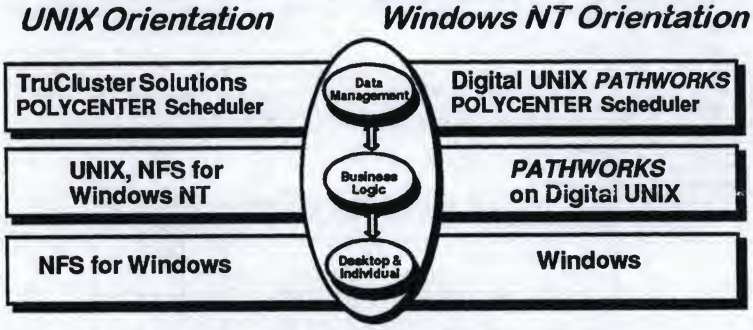
Dual Deployment of Existing Code (intrusive)

- Win32 APIs on Digital UNIX: (Mainsoft & Bristol)
 Windows NT developers write to Windows NT interfaces and deploy applications on Windows NT *and/or* Digital UNIX
- UNIX APIs on Windows NT: (Softway Systems and DataFocus)
 UNIX developers continue to write to UNIX interfaces deploying on Windows NT *and/or* Digital UNIX

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Applications: Sharing Data across platforms



Digital and Oracle Alliance for Enterprise Computing

Significant Partnerships:

- NFS on Windows NT: Intergraph, Hummingbird, NetManage, NCD
- Other key database partners available on both Digital UNIX and Windows NT: Oracle, Sybase, Informix, Software AG

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Applications: Common Management

Simplifying the Mix



- **Network management:**
 POLYCENTER Manager on NetView
- **System Management:**
 Digital and CA Alliance for Enterprise Management
 Tivoli TME10
- **PATHWORKS Version 6.0** - Advanced Server for UNIX plus NetWare support
 - Manages thousands of PCs and the UNIX server using Windows NT utilities,
 - LAN Manager 3.0 on UNIX; Windows NT trusted domain support
- **Utilities for cross-environment asset protection and planning**
 - POLYCENTER NetWorker Save & Restore - backup/restore
 - AltaVista Manager for Backoffice- software management
 - POLYCENTER Capacity Planner

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Microsoft Alliance



For the best return on Windows NT investments, it is critical that vendors are close to new Windows NT developments so that these new capabilities can be immediately exploited.

To ensure continued integration of UNIX & Windows NT, it is also important to contribute to the development of products in the Windows NT family.

	Digital	HP	IBM	Sun	SGI	Compaq	Other PC Vendors
Strategic commitment to NT	✓	?				✓	✓
Allied with Microsoft	✓					✓	
Global service and support	✓	✓	✓				
Trained personnel today	✓		✓				
Co-located Eng. with Microsoft	✓		✓				
Dual Architecture NT strategy	✓						
64-bit NT ready systems	✓						
Enterprise enhancements - NT	✓	✓	✓			✓	

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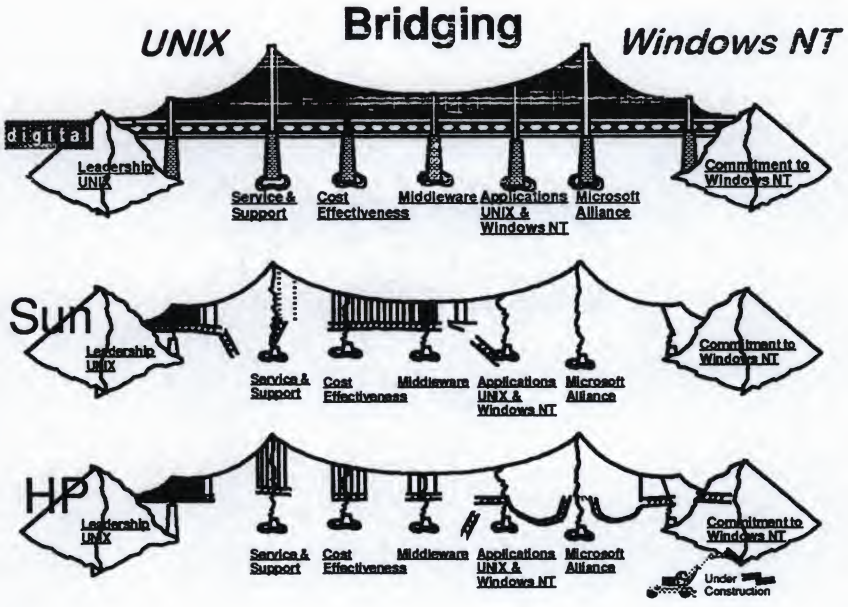
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ALLIANCE

FOR ENTERPRISE COMPUTING

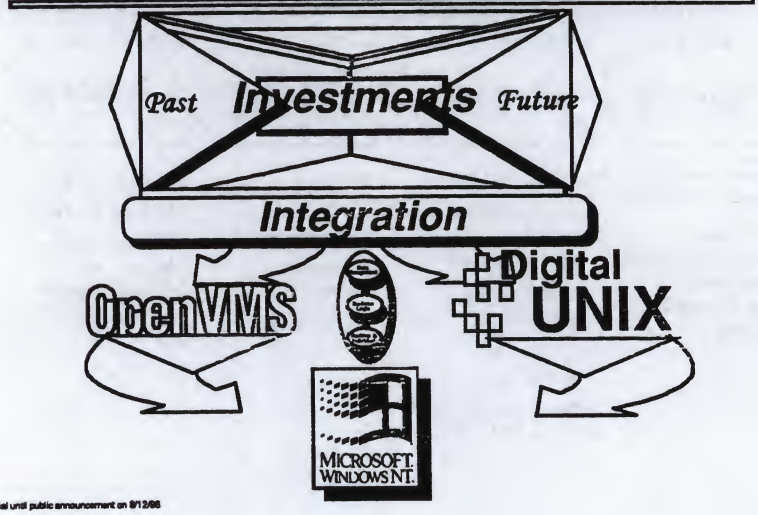
Unprecedented Cooperation in All Phases of Delivery

Technology	Products	Sales, Service & Support	Solutions
• Cross-licensing patent portfolios • Microsoft developing 64-bit Windows NT supported by Digital	• Email integration • Intel & Alpha products synchronized • Digital UNIX integration • OpenVMS integration • Windows NT and Backoffice tuning	• Training of field teams • Windows95/WNT migration assistance • Joint marketing	• Microsoft funds Digital SI expansion • Digital opens Microsoft Competency Center



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The Windows NT Integration in the Enterprise Program



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